

MIDI Tapper



H π **INSTRUMENTS**

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Documentation Changes

Below is a list of changes in *this* version of the documentation. Changes to *previous* versions are found in the Appendix.

Please report typos or problems with this text via email to hpiinstruments@zentral.zone

Current Version, v7 – March 11, 2024

- Introduction: removed *Crowdfunding*, added section *Keyboard Shortcuts*
- Chapter 2: edited text under *Velocity Scaling*, added sections *Tapping Off-On Gap*, *Legato or Non-quantized Source Data*, *Tapping with the Computer Keyboard*, *Tapping with the macOS Trackpad*, *Trills*, *Free Rhythms*, and *Two-Handed Tapping*
- Chapter 7: Selection Basics – added section on the *Selection Filter Window*.
- Chapter 8: added sections *Handling Non-Quantized Source Data* and *Drag-Editing Notes - Fringe Offset*
- Chapter 9: added sections "*Tap chords*" option and *Two-Handed Tapping*
- added *Chapter 14: Overdubbing* and reorganised chapters 15-19.
- Chapter 15: added section *The Articulation Menu*
- Throughout: update images of Preferences Window, made text formatting more consistent

Introduction

MIDI Tapper for Mac OSX and Windows allows you to perform music of any level of complexity quickly and easily, by playing with just one or two fingers on a MIDI controller. You can record, edit, and shape your music with the performance nuances you want, getting results with precise control in a fraction of the time it would take with conventional performance and recording methods.

System Requirements

Mac – OSX 10.14 or later • PC – Windows 7 or later, 2GHz minimum, accelerated graphics

Slower PC processor or graphics hardware results in unacceptable performance.

Features List

- imports and exports Type 1 Standard MIDI (.mid) Files *
- preserves meta events, patch changes, volume, and panning CCs
- built-in microtonal playback
- automatic 4-part harmonic analysis based on J.S.Bach Chorales
- supports wide variety of tuning file formats
- edit MIDI data graphically or in an Events List
- special features to support Hauptwerk virtual organ software
- score display options: barlines, meters, taps, markers, backgrounds
- creates a tapping stream by grouping MIDI events
- separate any grouped events to suit your performance needs
- mark ornaments and flourishes as Rubatos for independent expressive control
- sequence passages which are too complicated to tap
- customise note shapes and colors
- receive input from any MIDI controller
- tap via MIDI, computer keyboard keys, or the Mac Trackpad
- loop-rehearse any passage
- record any number of takes
- review and compare takes side by side
- splice takes together
- reshape velocity histograms
- overdub CCs such as Sustain Pedal events
- automatic bug reporting

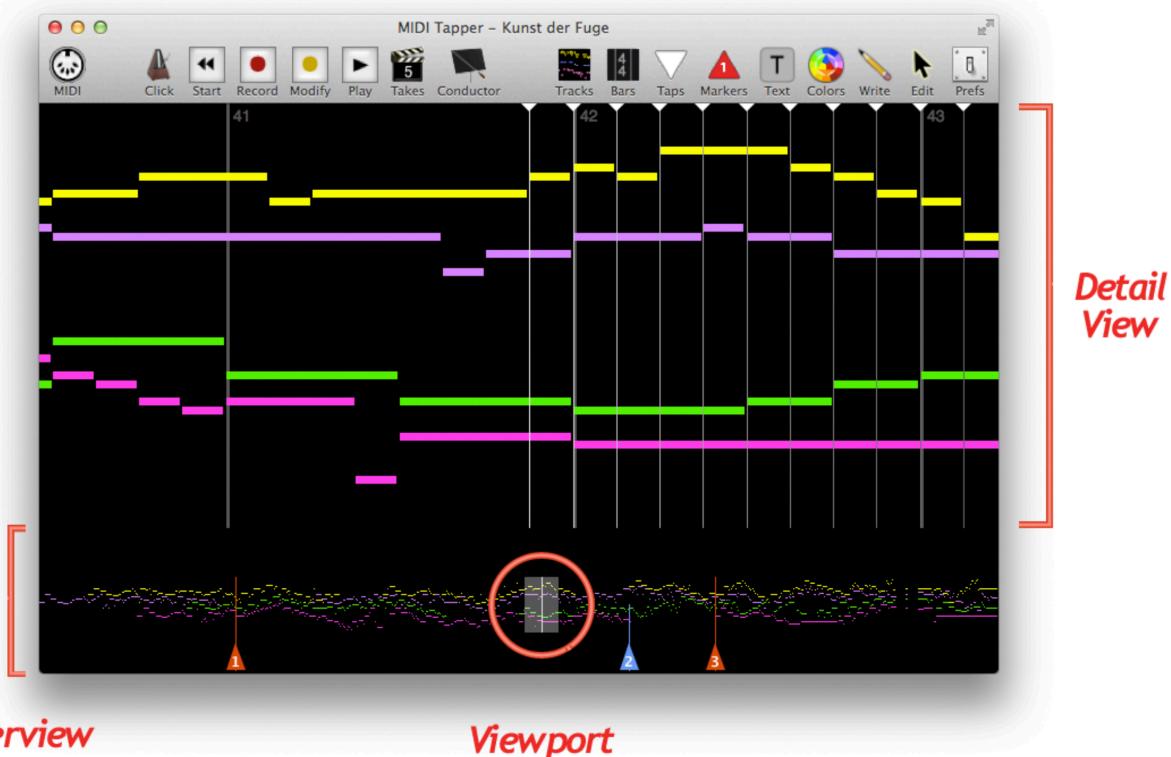
* MIDI Tapper is compatible only with Type 1 (Multi-Track) MIDI files.

About This Documentation

This documentation is written to be read from beginning to end. A summary of the user interface is provided in this introduction, which also explains normal workflow. Subsequent chapters explore topics in detail. An effort has been made to group related topics together, but cross-referencing between chapters is necessary.

User Interface Basics

MIDI Tapper has a straightforward, single-window interface with a toolbar for selecting MIDI options, recording, playback, various display options, modes, and preferences.



Overview

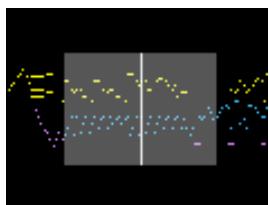
Viewport

Views – Overview, Viewport & Detail

An area across the bottom of the window (128 pixels tall) shows the entire imported MIDI File. This area is called the **Overview**. In the Overview is a semi-transparent box with a white line in the middle. This box is called the **Viewport**. The contents of the Viewport are shown above the Overview in expanded form filling the majority of the window. This area is called the **Detail View**. These displays always show the imported MIDI data, a.k.a. the *Source Data*. This is a very important point to remember.

The graphic Views in MIDI Tapper always display the *imported MIDI data*, which is referred to in this documentation as the *Source Data*.

Moving and Resizing the Viewport



The Viewport can be moved anywhere within the Overview by clicking and dragging it left or right when the cursor is a closed hand icon. Dragging with the **Control** key held allows moving the Viewport in any direction (up, down, left or right). Dragging with **Control + Shift** held allows only vertical repositioning.

When hovering with the mouse over the top, bottom, or right edges of the Viewport, the cursor icon changes to an arrow. Clicking and dragging a Viewport edge changes the size of the Viewport, and thus changes the contents of the Detail View. The default vertical size of the Viewport is determined by the highest and lowest notes in the source file, and the default horizontal size of the viewport is determined by the density of events in the source file. The Viewport size can also be changed by using **Zoom In** and **Zoom Out** menu items **Command =** and **Command -**.

Taps – Tap Pointer & Tap Lines

The white line in the center of the Viewport corresponds to the white line in the center of the Detail View. This line indicates where the next Tap will happen, and is called the **Tap Pointer**. In terms of musical time, the Tap Point represents “now”. To the right of the Tap Pointer are similar lines called **Tap Lines**, which show what is coming up next rhythmically. Chapter 2 focuses on the Tap concept and provides some tips on tapping technique.

Toolbar – Left Side

Buttons on the left side of the toolbar have to do with MIDI playback and recording.



MIDI – set MIDI Input and Output Ports and Synthesizer Options (see Chapter 1)



Click – turn a Metronome “Click” on or off, or to change the playback or count-off tempo. The default tempo shown matches the value found in the imported MIDI file, which you can change as needed



Start – move playback to the beginning of the current Take, or if the current position is already the beginning of the current Take, then move to the start of the source file (a.k.a. rewind)



Record – record a Take (see Chapter 11), + Shift – **Overdub** (see Chapter 14)



Modify – modify selected notes of a Take (see Chapter 13)



Play – from the current tap position, play the selected source file or recorded Take



Takes – (see Chapter 11) select the source file or a Take for playback; rename, delete, retake, export, duplicate, copy, or splice Takes; review Takes, or open the currently selected Take in a new window



Conductor – play back a recorded Take via recorded Taps (see Chapter 1).

Toolbar – Right Side

Buttons on the right side of the toolbar have to do with display and editing.



Tracks – show, hide, or select Tracks and Channels; select Note Heights, Auto-number Channels per Track (see Chapter 3)



Score – show or hide barlines, measure numbers, time signatures, Grand Staff lines, and background image



Taps – hide or show Taps; turn velocity scaling on or off (See Chapter 2)



Markers – hide or show Markers and Marker Lines, select current Marker color and line length (see Chapter 6)



Text – add a Text object at the current Tap Pointer location (see Chapter 6)



Colors – select the color display option; edit and create custom Color Sets (see Chapter 4)



Shapes – assign note shapes to Tracks and Channels (see Chapter 5)



Analysis – display Chord Symbols, Roman Numerals, Voice Crossings, and Note Names for any source data implementing 4-part harmony (see Chapter 17)



Write – switch from Edit Mode to Write Mode; turn Snap To Grid on or off; select the Track and Channel to which to write (see Chapter 8)



Edit – switch from Write Mode to Edit Mode (the default Mode)



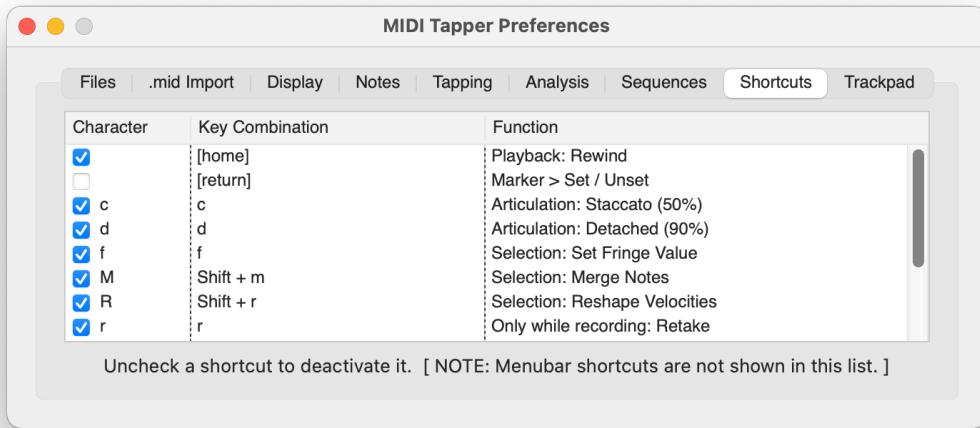
Prefs – open the Preferences window

Keyboard Shortcuts

In MIDI Tapper there are two types of keyboard shortcuts:

Shortcut Type	Description	macOS	Windows
Menu	A keystroke plus at least one modifier key, to select an item in the Menubar.	Command + key possibly + Shift , and/or + Option	Ctrl + key possibly + Shift , and/or + Alt
Quick	A single keystroke, to select something otherwise only available through a Popup-menu or Toolbar selection	key possibly + Shift	key possibly + Shift

Menu shortcuts are listed in the menubar, and **Quick** shortcuts are listed in the Preferences Window.



Quick shortcuts save time by selecting functions that otherwise require menu navigation. Each shortcut can be deactivated by unchecking a checkbox (reasons you might want to do that are discussed in **Chapter 2**).

Currently, **Quick** shortcuts are not user-assignable, but their number may be increased according to your input. Use the menu item **MIDI Tapper > Send an Email** to explain your idea, keeping in mind that a shortcut can only call an existing function. If your idea involves a function that doesn't already exist, see **Feature Requests**, below.

Workflow

The following steps characterise a typical workflow for a MIDI Tapper recording project:

1. *Import* a Standard MIDI file (Type 1 .mid files only)
2. Test *Playback* and adjust *MIDI Settings* and *Synthesizer Output* if needed.
3. *Tap* through the file.
4. *Group / Ungroup* notes as needed.
5. Select appropriate *Colors, Shapes, and Note Heights*.
6. *Edit* the source data as needed.
7. Assign *Rubatos* (trills and free rhythms) as needed.
8. Add rehearsal *Markers* as needed.
9. Define *Sequences* as needed.
10. *Rehearse* Passages as needed.
11. *Record* as many Takes as needed.
12. *Splice* Takes together as needed.
13. *Modify* Takes as needed.
14. *Reshape Velocities* as needed.
15. *Edit* and *Export* a final Take (as a Type 1 .mid file).

The terms shown in ***Bold Italics*** above comprise the main topics of this documentation.

Bug Reporting and Feedback

Please report any problems you may experience with MIDI Tapper directly by using the menu item *Report a Bug*. Before doing so, please also check the [MIDI Tapper reports webpage](#), which lists all known issues and feature requests. Please send feedback and suggestions by email directly or using the menu item *Send an Email*.

Kindly do not post complaints in Mac App Store Reviews, as there is no way to correspond with you to correct the problem in that case. When you report a bug directly as described above, support will proceed via email to resolve the issue.

Feature Requests

If the software does not do something you would like it to do, and you are willing to pay for the feature you want, use the menu item *MIDI Tapper > Request a Feature* to describe the feature and make an initial offer to pay for it. A professional wage for programming is not expected. 20 € is an acceptable starting point, considering that adding any feature requires

many hours of work. If your offer is reasonable, your idea makes sense, and the feature could conceivably benefit many users, then a payment schedule is agreed upon and a testing stage begins. Once testing is done and the feature is verified as working, a new version of the software is released including the new feature.

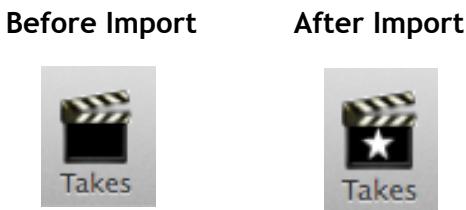
Not all features are possible or will be considered relevant for the majority of users. A minimum offer of 20 € is suggested for all Feature Requests.

1. Importing and Playing Back MIDI Files

A MIDI Tapper (.miditapper) Project begins by importing a Standard MIDI (.mid) file which is referred to as a *source file*. It is assumed that the user is familiar with MIDI files. Resources for learning about MIDI are available online at midi.org

Importing a MIDI File

To import a MIDI file, type Command-I or select the menu item **File > Import MIDI File**. The file should be a Type 1 (multi-track) MIDI file. Type 0 files may import without error, but the data will not display properly. The Takes toolbar button will indicate that a MIDI file has been imported by displaying a star.



MIDI File .mid Import Preferences

A Type 1 MIDI File consists of one tempo track (Track 0), and one or more voice tracks. The tempo track is imported without filtering any of its data. The data read from each voice track depends on which options you choose in the Preferences Window under the *.mid import* tab.

- Note ON / OFF
- Patch change
- Volume CC
- Panning CC
- Meta events
- Pitch Bend

Timing Threshold for Taps

By default MIDI Tapper will group together MIDI events which share common event times. When events are not all exactly aligned in a MIDI file (for example, from a MIDI recording of a live performance), events can be grouped together within some timing threshold by selecting *Use Time Threshold for Tap Grouping* in the Preferences window.

Categorical Tempo Text

To display a tempo indication for imported MIDI files, check that option in the Preferences Window under the *Display* tab. Note that such indications may not be musically accurate.

Possible Import Parsing Issues

MIDI Tapper has been tested with a wide range of MIDI files, but not all MIDI files are created equally. Particularly if you are not the creator of the MIDI file (for example, if you found the

file on the internet) please beware that some files may contain data that will not parse correctly in MIDI Tapper. If you experience a problem with a specific MIDI file that you know is properly formed, please send an email to hpiinstruments@zentral.zone explaining the problem, including the MIDI file as an attachment.

Type 1 MIDI files improperly containing note data on **Track 0** are corrected on import.

Possible Post-Import Issues

If you have created a source MIDI file, it is assumed that you have organised the tracks and channels the way you want them; however, if you are working with a MIDI file you did not make yourself, one of the first things you should do is to look at the Track and Channel structure of the file and take careful note of how it is organised (see Chapter 3).

During Beta Testing, MIDI files from many diverse sources were imported into MIDI Tapper. Several problems with MIDI files which parsed correctly but nonetheless confused users were found. Here is a short list of things to look out for in MIDI files that you have not made yourself:

- 1. *duplicated tracks*
- 2. *inconsistent tracks and channels*
- 3. *temperament tuning channels*
- 4. *rotating channels*

1. duplicated tracks — In a MIDI file, the same MIDI data may be duplicated on two or more tracks. This is sometimes done with keyboard tracks in order to strengthen the output, or double octaves via patch layering rather than note transposition (such as sending the same data to several organ stops at once, as would be the case in real organ registration). In this case, MIDI Tapper will display notes from different tracks on top of each other, and it is not possible to see at a glance that several tracks contain identical data using the default shape (*Rectangles*). It is therefore a good idea after importing a file that you did not create, to click the Tracks button and compare the number of tracks listed there to the number of tracks you can see displayed. If the number of tracks is greater than you can see, try showing and hiding tracks, or assigning unique note shapes to each track. Finally, delete any duplicate tracks.

2. inconsistent tracks and channels — Some MIDI files may have data haphazardly (illogically) shared between any number of tracks and channels. Within MIDI Tapper it is possible to reassign notes to different channels and tracks, but for large files having a lot of haphazard note assignments, it will make more sense to edit the file in some other software, look for an alternative MIDI file, or simply make a new MIDI file from scratch yourself.

3. temperament tuning channels — Some MIDI files are made with 12 tones in any octave separated onto 12 MIDI channels. This is done in order to output in a 12-tone tuning other

than 12-tone Equal Temperament. This problem can only be solved by manually selecting notes and assigning them to desired tracks and channels.

4. rotating channels – Some MIDI files are made with each next note of a track output on a different channel. This is a technique used to achieve microtonal output, where each note is preceded by pitch bend data. (Because pitch bend is a MIDI channel message, each next note needs to be sent to a new MIDI channel.) While this is a practical solution for getting microtonal output from a MIDI file, it is not ideal for working in MIDI Tapper. The problem can only be solved by selecting notes and assigning them to desired tracks and channels. For large files, it may be easier to use a separate application for this type of editing.

Reimporting a MIDI File

Sometimes after importing a MIDI file, it becomes apparent that the source file needs to be edited. Although MIDI Tapper does provide basic editing functions, often it will make more sense to use the application which created the MIDI file (such as a notation program) to edit the file. For these cases, MIDI Tapper provides an option to ***Reimport*** a MIDI file that has been previously imported. Since editing can sometimes require several iterations (tweaking), the idea is to save time by not having to go through the import dialog and select the same file every time for importing. Reimporting retains Markers and Hauptwerk registrations.

Advice on Creating MIDI Files for MIDI Tapper

Source files for MIDI Tapper should contain data corresponding exactly to a musical score, as opposed to a MIDI recording of a live performance. To optimise a score-data source file for MIDI Tapper, make sure the file is multi-track. Type-1 MIDI having only a tempo track and one other track containing all the data are not ideal, because voices are then difficult to isolate. Staves and voice ranges should be separated into individual tracks. A piano piece should at least be separated into tracks for the treble and bass staves. To simplify synthesizer output, the notes of each track should be assigned to the same channel number as the track; for example, notes on track 3 should be assigned to MIDI channel 3. The menu item ***Tracks > Auto-number Channels per Track*** can be helpful in this regard (see [Chapter 3](#)).

Setting up MIDI Preferences



In order for MIDI Tapper to work properly, you must set up your MIDI Input Source and Output Destination. To do this, click the MIDI icon in the toolbar, or select the menu ***MIDI > Input / Output***. If you change anything in your MIDI setup while MIDI Tapper is open, and you want to connect to the newly connected device(s), you must open the MIDI window and click ***Rescan*** to see the newly connected device(s) in the input or output lists.

IMPORTANT: Selecting the same MIDI Port as both the Input Source and the Output Destination creates a ***MIDI Feedback Loop***, which will crash the application.

Apple DLS Synthesizer

On computers running OSX, a default output synthesizer is provided by Apple which supports Soundfonts. This synthesizer also supports **monotimbral GM microtuning** (see *Microtonal Playback*, below). Mac users can begin using MIDI Tapper with immediate output results by selecting this synthesizer as the default MIDI Output Destination.

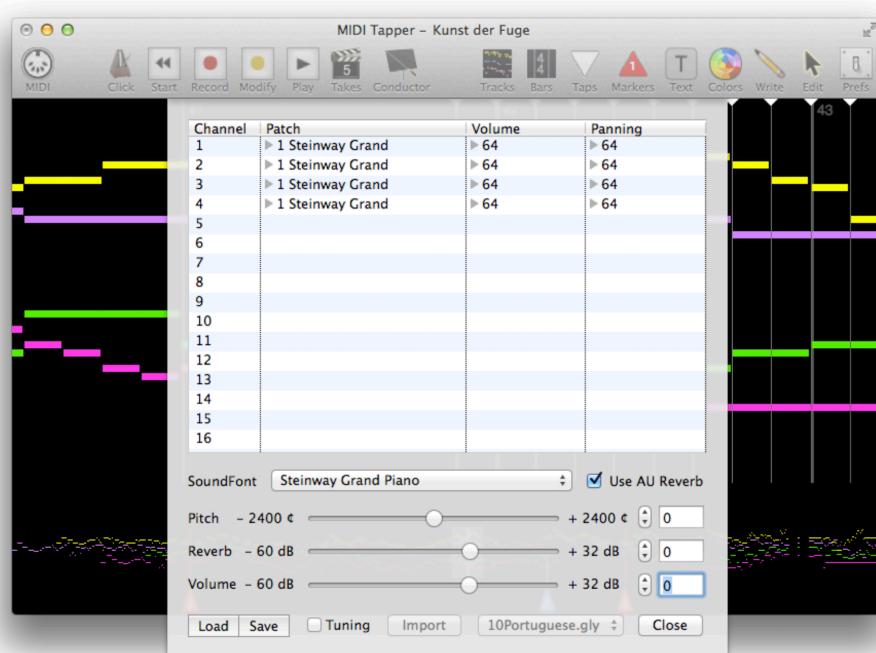
Windows GS Wavetable Synth (Latency Problems)

Windows users with standard installations of Windows are at a distinct disadvantage compared to Mac users, because the default Microsoft synthesizer for Windows has an output latency of around half a second. The extremely poor performance of this synthesizer makes it basically unusable as a MIDI Output Destination for MIDI Tapper. Windows users are encouraged instead to send MIDI output to an external hardware or some other software synthesizer. While virtual MIDI ports are standard on Mac OSX, Windows users must install a virtual MIDI router such as MIDI Yoke or LoopBe1 to allow sending MIDI to another application.

Multitimbral Playback

Multitimbral source files will only play back properly when MIDI is sent to a multitimbral Output Destination. On Mac, by default the Apple DLS Synthesizer is multitimbral. On Windows, the default Windows GS Wavetable Synth is also multitimbral, but due to latency this synthesizer is not usable for live tapping. (It may be usable for playing back the source file and any recorded Takes).

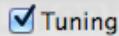
MIDI Synth Options window



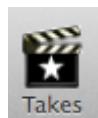
The MIDI Synth Options window is available for easily selecting the Patch, Volume, and Panning of each MIDI output channel. Only the *MIDI Channels* in use by the current file are shown in the list. Channels are not differentiated by track, so for example Track 1-Channel 1 and Track 2-Channel 1 are both listed as Channel 1. This means that you must assign unique channel numbers to the voices your source file in order to allow unique output timbres per voice. To save you trouble some cases, a convenience function *Auto-number Channels per Track* is available via the **Tracks** button (see [Chapter 3](#)).

For Mac users, when the Apple DLS Synth is selected, parameters for SoundFont, global Pitch, Reverb, and Volume are also available. Synthesizer settings can be stored and retrieved to save time preparing output with frequently used settings. The most frequently used synthesizer settings can also be saved as a default in the Preferences.

Microtonal Playback

 **Tuning** Check the *Tuning* checkbox in the **MIDI Synth Options** window to configure MIDI output for GM microtonal playback. Note that in this mode, the output will always be *monotimbral*. MIDI Tapper supports seven types of tuning files *.scl*, *.csv*, *.hz*, *.tun*, *.mtx*, *.gly*, and *.tonex* (see [Appendix](#)). For multitimbral microtonal playback, output from MIDI Tapper can be sent to [microsynth](#).

Playing Back a Source File



When the Takes icon shows a star, the imported source file is ready for playback.



Click the Play button to play back the source file. Click it again to stop playback.



Playback begins at the current Tap Pointer location. Clicking the Start button moves playback to the beginning of the file.



The Tempo of Take playback can be changed under the Click menu.

During playback, rather than scrolling, the display shows the music which is currently playing, changing only when necessary.



Animated playback is also available through the Conductor. Be sure to understand the difference between recorded MIDI data and source data before using this function (see [Chapter 8](#)).



2. Tapping Basics

Once you have imported a file successfully and configured MIDI Settings, you are ready to start making music. The basis of musical performance in MIDI Tapper is a single key-press on a MIDI controller * called a *Tap*. *Tapping* is defined as follows:

Tapping is a computer-assisted approach to performance in which music within a normal range of complexity can be performed using only one key on a MIDI controller.

* A computer keyboard can also be used, but the results are less expressive.

The language above “normal range of complexity” refers to music which would normally be described as playable in the normal way on an instrument. For music which is too complex for human performance, or too complex for tapping for whatever reason, the **Sequence** can should be used (see Chapter 19).

Tap Groups

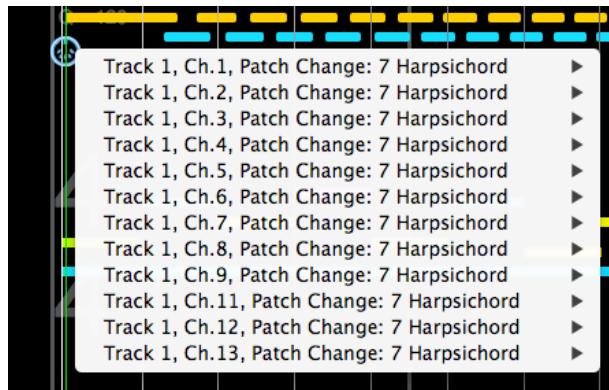
A piece of music typically consists of rhythmically organised notes, written as single lines (melodies), or groups (harmonic intervals and chords). Single notes, harmonic intervals, and chords all share this in common: each requires only one *position* in a score. Note positions in a score are converted to note *times* in a MIDI file. This leads to the concept of **Tap Groups**.

A **Tap Group** (or loosely just **Tap** or just **Group**) is a collection of *one or more* Note ON events happening at the same time* in a MIDI file.

* see *Timing Threshold for Taps* above, and *Grouping and Ungrouping Taps*, below.

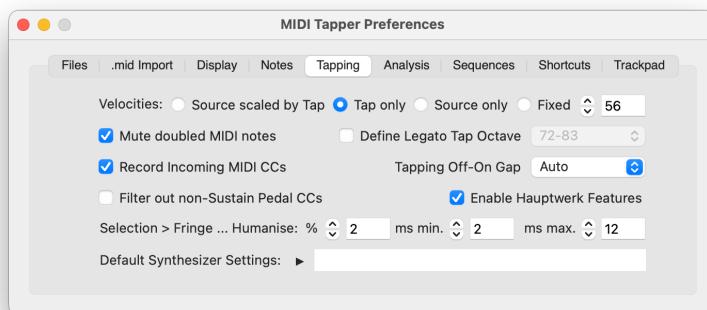
Including MIDI Patch Changes, Volume, Panning, & Pitch Bend

In the Preferences Window, Patch changes, CC events, and Pitch Bends occurring at the same time as any Note(s), can also optionally be included in Tap Groups by selecting these options on the **.mid Import** page. Note that changes made to these settings apply only to source files imported *after* the settings have been changed. MIDI messages included in a tap are shown with a MIDI icon. The included messages can be viewed and edited by clicking on this icon.



Velocity Scaling

A Group of notes does not necessarily have a uniform dynamic level; i.e. one note in a chord may be played with a louder dynamic than the others. MIDI Tapper accommodates this musical requirement by combining the dynamic of the Tap with the dynamics of the notes in the Tap Group when **Source scaled by Tap** is selected in the Preferences Window. The loudest note in the Group is scaled to equal the Tap velocity, and the other notes in the Group are scaled proportionally, for a natural-feeling response which allows expressive control of the dynamic relationships existing in the source file. The default option is **Tap Only** which applies the same velocity value to all notes in a Group.



Tap velocity can also be given by the Tap input only, or the Source only (unscaled). In cases where you have a velocity sensing input controller but need a result which does not vary in velocity, use the option **Fixed**.

Tapping Off-On Gap

When **Auto** is selected (the default), MIDI Tapper handles note releases according to the articulation you use when tapping. If you tap in a legato manner, Notes which MIDI Tapper automatically turns off will overlap for 30 ms. A popup menu allows you to change this millisecond “gap” to other values, including a value you define. If you define a *negative* value, automatic notes will *never* be legato; rather, when your taps are legato, MIDI Tapper will separate recorded notes by the number of milliseconds you define.

Legato Tap Octave

For solo lines in particular, fine control over the release of each note and the ability to overlap notes in a *legato* phrase can be musically important. Use the option **Define Legato Tap Octave** to have fine release control when tapping with a specific octave of keys. Note that this option will only work properly for monophonic lines, or for polyphonic lines which do not have independent rhythms (which are *homophonic*).

Muting Doubled MIDI Notes

This option is included for polyphonic keyboard music in which two voices on different MIDI channels sometimes play the same note at the same time. Some synthesizers (such as the Apple DLS Synthesizer) will respond to this by doubling the output sample for that note, giving an unnaturally loud result, so that doubled notes “stick out”. Muting one of the notes solves this problem. If both notes are the same length, the note with the smaller channel number gets muted. If one note is longer than the other, then the shorter note is muted. You can set this property by **right-clicking** on a note or selection and selecting **Playback > Skip** or **Play**.

Grouping and Ungrouping Taps

MIDI events in a source file which occur at the same time, or within some timing threshold of each other, are collected into Tap Groups (you can specify a threshold in milliseconds in the Preferences window under **.mid Import > Use Time Threshold for Tap Grouping**). Some keyboard shortcuts and menu options can help you make the Tap Groups the way you want them after importing. The many ways that notes can be selected are explained in **Chapter 7**. Menu shortcuts are summarised below.

Menu Item	Keyboard Shortcut	Description
Taps > Group	Command-G	Group Selected Notes *
Taps > Group with Next	Command-Option-G	Combine the Tap Group at the current Tap Pointer location with Next Tap Group
Taps > Group with Previous	Command-Shift-G	Combine the Tap Group at the current Tap Pointer location with Previous Tap Group

* Note that if you select notes which are far apart and try to Group them together, MIDI Tapper may not be able to place them into a Tap Group. In that case, you will either have to select notes and nudge them left or right in order to align them close enough for them to be able to be grouped together, or simply use one of the other grouping shortcut options.

If notes have been grouped together which you prefer to separate (for example, to play a chord “rolled”, as an arpeggio, instead of “straight”, with all notes attacking at the same time) there are Ungroup menus and shortcuts for this purpose.

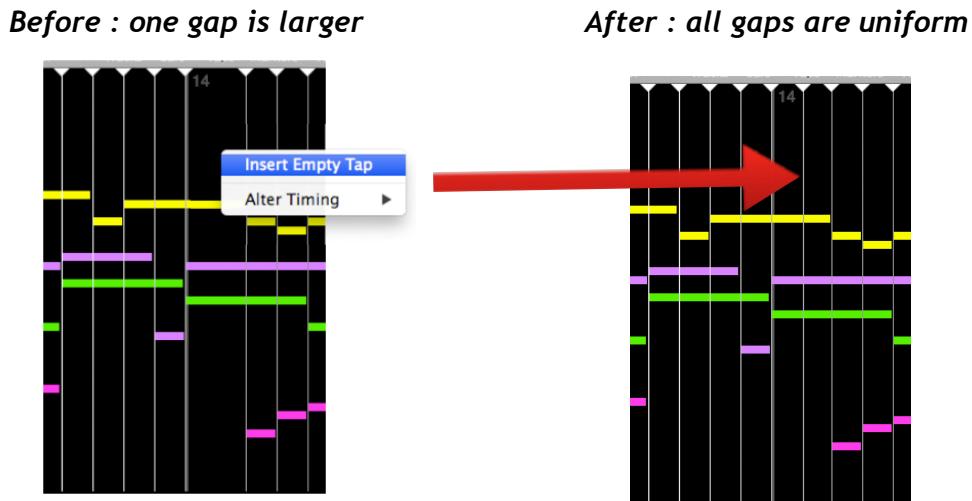
Menu Item	Keyboard Shortcut	Description
<i>Taps > Ungroup > Upwards</i>	<i>Command-U</i>	Separate the notes of a selected Tap Group from the bottom up (normal direction for a “rolled chord”).
<i>Taps > Ungroup > Downwards</i>	<i>Command-Shift-U</i>	Separate the notes of a selected Tap Group from the top down (reverse direction for a “rolled chord”).
<i>Taps > Ungroup > With Options</i>	<i>(none)</i>	Separate the notes of a selected Tap Group from the bottom up, or from the top down, with a specific span of time between the notes.

Arpeggios Using Fringe Offsets

Ungrouping notes to produce an arpeggio requires a sort of “strumming” as compared to normal tapping, because instead of one tap for many notes, you have to tap each note separately. To avoid changing your tapping technique for arpeggios, MIDI Tapper also allows you to record them as a single tap, without ungrouping notes. This is done by moving *fringe offsets* for individual notes, placing note attacks *before or after* the actual tap, in any order. A limitation of this feature is that you cannot hear the altered attack pattern in real time as you tap; it will only be heard when playing back a recorded take. When you move fringe offsets in the source data, notes already recorded will be moved accordingly. For more information on *Fringe Offsets*, see Chapter 16.

Inserting Empty Taps

Sometimes a passage may be easier to tap when its rhythm is made more uniform. This can be done by inserting an *Empty Tap* (or several Empty Taps) into the Tap Stream. An Empty Tap functions the same as a normal Tap from a tapping standpoint, but it contains no notes. An Empty Tap can be inserted by clicking at the desired insert location and selecting the menu item *Taps > Insert* or by *right-clicking* in the desired insert location and selecting *Insert Empty Tap* from the popup menu. Below, a passage is shown before and after an inserted Empty Tap is inserted via *right-click* to make the tap stream rhythmically uniform.



Sustain Pedal Behaviour

Sustain CC messages are not read from source files. Depressing and lifting a sustain pedal is considered a real-time parameter to be inserted anywhere into a tapped performance, as would be expected when playing a midi keyboard in the conventional way. Behaviour of the sustain pedal during tapping is as would be normally expected. When the pedal is depressed, all notes continue to sound. When the pedal is raised, notes which have been released stop sounding, and notes which are still held continue sounding.

If you find that your sustain pedal behaves in reverse with MIDI Tapper, simply open the **MIDI Input/ Output** window and change the state of the Sustain ± checkbox.

Legato or Non-quantized Source Data

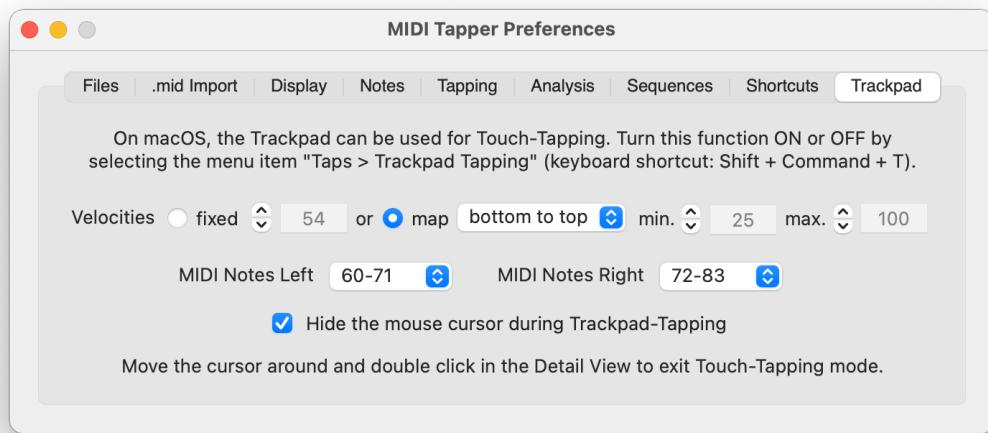
Some MIDI files have MIDI data which does not import ideally into MIDI Tapper. Notes may overlap unexpectedly, or notes may not group together as expected, such that control of articulation and timing are inconsistent when tapping. To deal with such files, see **Chapter 8**.

Tapping with the Computer Keyboard

If you don't have access to a MIDI keyboard, you can tap with fixed velocity using the keys of the computer keyboard. Depending on which keys you want to use for tapping, you may want to disable certain Quick keyboard shortcuts by unchecking those keys under the **Shortcuts** tab in **Preferences Window**. Because computer keyboards are not designed for this purpose, certain key combinations may not permit legato tapping. The **Rubato** function (see **Chapter 9**) has a provision for assigning certain keystrokes to the **Rubato**, so that two-handed tapping and free rhythms are possible (see **Trills, Free Rhythms, and Two-Handed Tapping**, below).

Tapping with the macOS Trackpad

On macOS only, you can also tap using the Mac Magic Trackpad. Since this is a multi-touch surface, considerable control is possible for expressive tapping with fine articulation, including real legato tapping. Velocity is controlled by position with a number of options, including a selectable velocity range, and ranges of MIDI notes assigned to each hand. These options are set in the **Preferences Window** under the **Trackpad** tab.



Because the trackpad is a general input device used for navigating the computer, it is not possible to use it in a non-standard way without changing its normal function. The checkbox **Hide the mouse cursor during Trackpad Tapping** lets you select whether MIDI Tapper takes control of your trackpad while you are tapping with it. If you use this option, beware that you cannot use the trackpad for other tasks until trackpad tapping has been turned off again. You can return to normal function by moving the cursor around and double-clicking in the **Detail View**, or by selecting the menu item **Taps > Trackpad Tapping Off**. The mouse cursor will then become visible again and the trackpad will return to normal function if you toggle out of the application.

Hiding the mouse cursor during trackpad tapping changes the normal expectation for the use of your trackpad. Be sure you understand how to return to normal use!

Trills, Free Rhythms, and Two-Handed Tapping

Passages containing trills, turns, and other free ornaments or cross rhythms may be difficult to perform, or may sound too “square” when tapping. MIDI Tapper provides **Rubatos** as a means to handle these situations (see **Chapter 9**). This feature also allows you to tap left and right hands separately but simultaneously throughout, should you want to do that.

Extremely Difficult Passages

For passages that are too difficult to tap either in the normal way or using *Rubatos* (Chapter 9), MIDI Tapper provides *Sequences*. Notes assigned to a sequence will play back automatically without having to tap the rhythm at all (see Chapter 19).

Advice for Tapping

A high quality velocity sensing MIDI keyboard controller is recommended for tapping, but many different kinds of controllers can be used (including the macOS Magic Trackpad). Keep in mind that different passages of music can also be realised in various ways using a variety of tapping techniques.

The following list of things to try out refers to the use of a standard MIDI keyboard. If you are using an alternative controller, try coming up with equivalent variations for that controller. Experiment and see what works best for you.

SOME IDEAS: Try tapping with ...

- 1 finger only
- 1 hand only, multiple fingers
- 2 hands alternating, 2 fingers
- 2 hands alternating, multiple fingers
- white key(s) only
- black key(s) only
- white and black keys
- always same keys
- always different keys
- scale patterns
- etc.

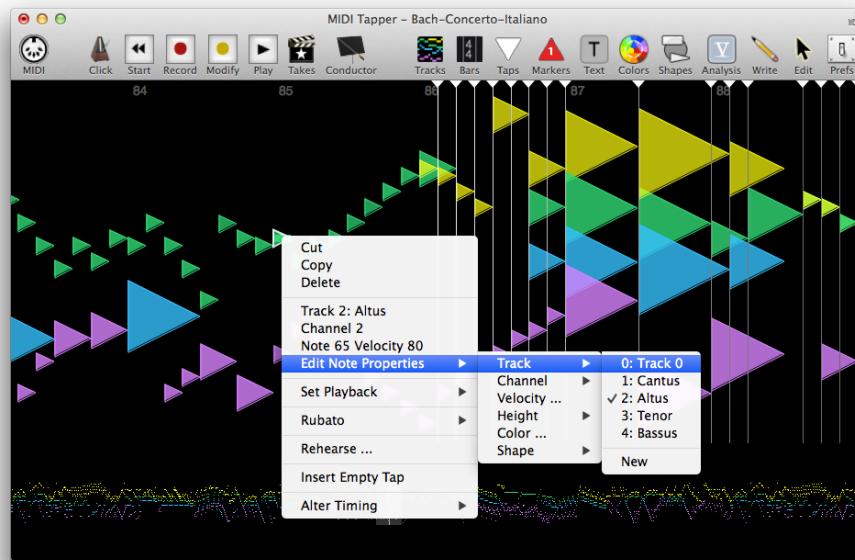
Before recording a take, tap through the music to find out what works and where difficult passages may require rehearsal or eventual splicing. The following chapters explain important concepts that will help you prepare for making recordings.

3. Notes, Tracks & Channels

MIDI Tapper displays MIDI notes corresponding to different properties. After importing a MIDI file, you have control over note the MIDI properties of the notes (Pitch, Velocity, Track, and Channel assignments) as well as display properties (Color, Shape, and Height).

MIDI Properties of a Note

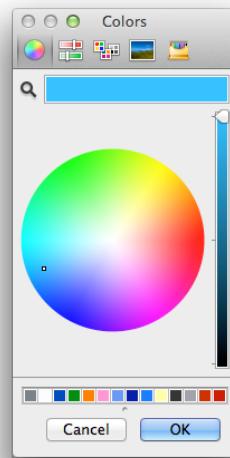
Four basic properties of a MIDI Note are: *Pitch*, *Velocity*, *Track*, and *Channel*. The Pitch value is changed by dragging the note up or down. To change the Track, Channel, or Velocity of a note, simply **right-click** on the note and select **Edit Note Properties** > A popup menu will appear, showing you these note properties, as well as other information and options. More information on editing these and other MIDI properties of notes is given in **Chapter 8**.



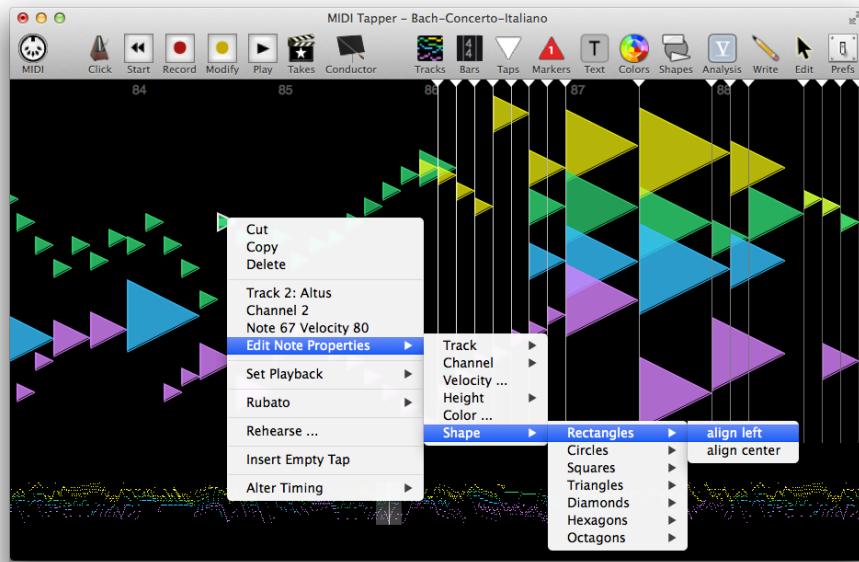
Display Properties of a Note

MIDI Tapper adds three display properties to each Note, the first of which, *Color*, corresponds to MIDI data. Notes are displayed by default with colors according to Track and Channels. To change the color of any note directly, simply **right-click** on the note, and choose the menu item **Edit Note**

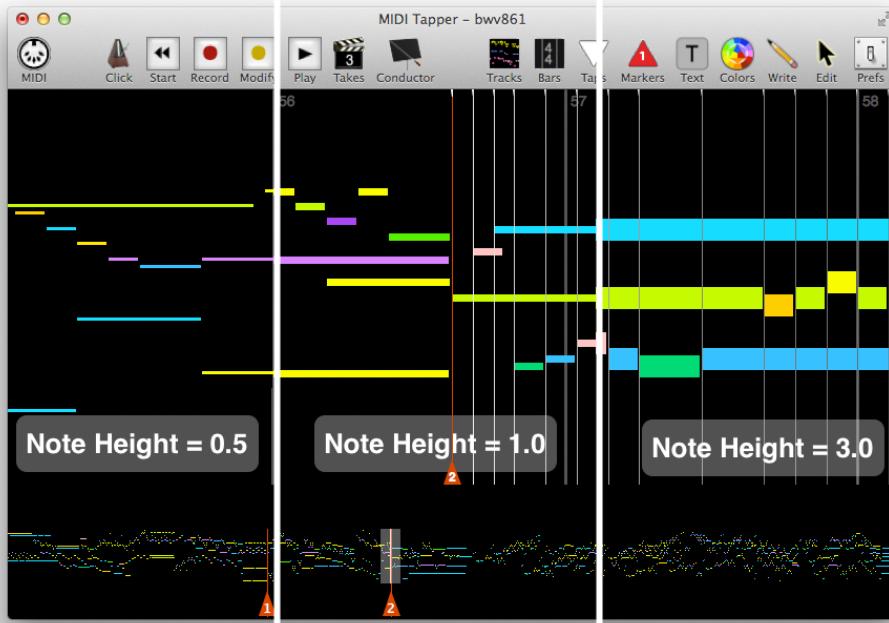
Color... to open a standard color picker window allowing you to choose any color for the note. Depending on which Color Display Option you are using, all notes sharing the same property will also change to the selected color. When using one of the default Color Sets, you will then be prompted to name a new Color Set. When using a Color Set you have created, the Color Set is simply modified and saved. Set **Default Note Colors** for new projects in the Preferences. To get an idea of various possibilities, try the menu item **Display > Random Note Colors**. Complete information on Color Display Options and Color Sets is given in **Chapter 4**.



The *Shape* of the note is also visually important. Notes are displayed by default as *Rectangles*. To change the shape of any note directly, simply *right-click* on the note, and selecting **Edit Note Parameters > Shape >** to open a cascading menu of choices for different note shapes. Shapes for new projects are defined in the Preferences window under the **Notes** tab. To get an idea of various possibilities, try the menu item **Display > Random Note Shapes**. Complete information on Note Shapes is given in **Chapter 5**.



The appearance of some note shapes can be altered by assigning a note *Height* property. Below, three different settings are shown for all tracks side by side for the default note shape *left-aligned Rectangles*.

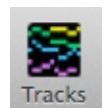


A note height of 1.0 means that the note occupies the space of an equal fraction of the vertical span of the Viewport. For example, if the Viewport spans 50 notes, then the default note height (1.0) is equal to 1/50 of the vertical height of the Detail View. Although this property applies to notes, it is assigned per Track. You may want to change the note height in order to more easily distinguish tracks at a glance, to increase the height of stretched Shapes (see [Chapter 5](#)), or you may want to change the note height of all tracks at once. The note height of an individual Track, or all Tracks together, can be changed under the toolbar menu **Tracks > Note Height**. You can also choose a **Default Note Height** in the Preferences. To get an idea of various possible combinations, try the menu item **Display > Random Note Heights**.

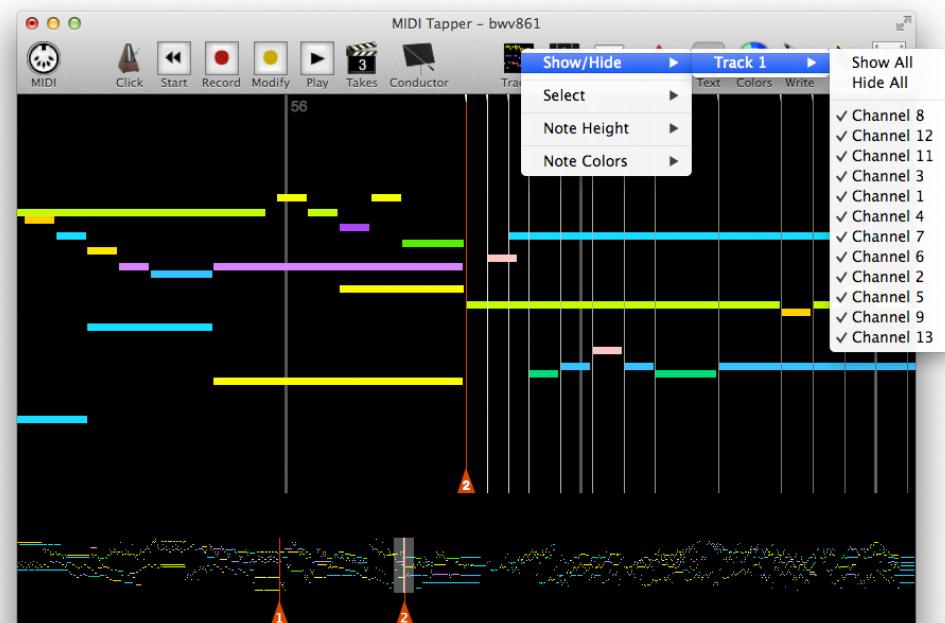
Set Playback – Play / Skip

Every note has a **Playback** property which you can set arbitrarily. By default, the playback property for all notes is **Play**. A note can be muted by changing the Playback property of the note to **Skip**. As mentioned in [Chapter 2](#), selecting **Mute doubled MIDI notes** in the Preferences will tell MIDI Tapper to when importing files to handle cases where different channels have the same note at the same time by setting the Playback property of one of the doubled notes to Skip.

Tracks & Channels – Show / Hide, Select



The Tracks and Channels of an imported MIDI file can be selected, shown, or hidden by clicking the **Tracks** toolbar button and choosing the corresponding menu item. It is possible to select an entire Track or only one Channel from a Track. For files having more than one track, it is also possible to selectively show each track alone using the keyboard shortcuts **Command-1**, **Command-2**, **Command-3**, and so on.



Auto-numbering Channels per Track

As mentioned in **Chapter 2**, synthesizer output differentiates timbres by channels, so that settings are simplified when voices have unique channel numbers. The menu item **Tracks > Auto-number Channels per Track** can save you time by uniquely numbering all existing channels per track. For example, if all tracks contain only one channel, then selecting this option will assign notes on Track 1 to Channel 1, notes on Track 2 to Channel 2, and so on. For multiple channels per track, the channels are simply numbered in ascending order starting with Track 1. In some cases you may want to separate notes on a given track into some other channel configuration. In those cases, MIDI Tapper cannot automate the task as it cannot know which notes you want to assign to which channel, so you will have to select notes and assign the channels manually. There are many different ways to select notes, which can still save you some time in these cases (see **Chapter 7**).

4. Color Display Options & Color Sets



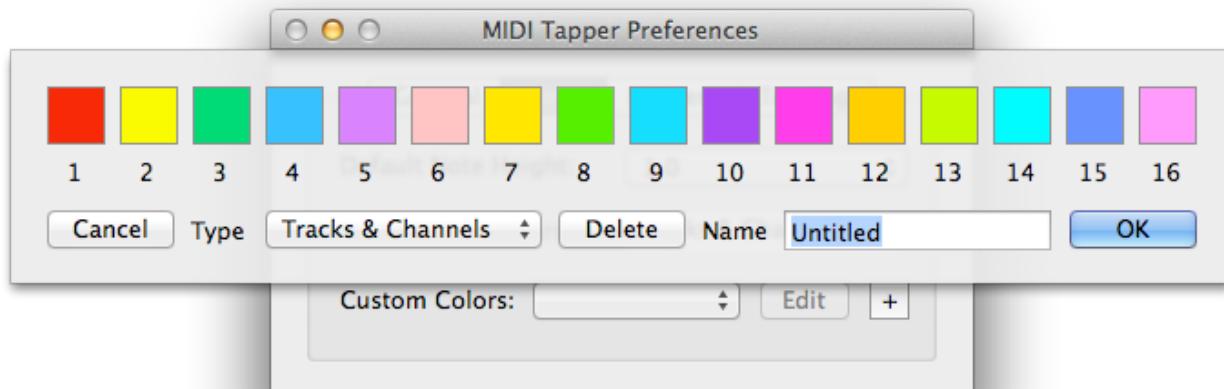
If display properties don't interest you, it's safe to skip this chapter, which is about controlling the colors used to represent MIDI note properties. MIDI Tapper provides six different default options, and allows you to create your own custom Color Sets according to any of these six general patterns.

Custom Color Sets

The creation of Custom Color Sets is handled through the Preferences window; screenshots are therefore shown below to explain the logic behind each default option. When creating a Color Set in the Preferences window, simply click on each color box to assign a new color.

Color by Tracks & Channels

This is the display option used by default, and is intended to provide reasonable differentiation between Tracks and Channels. When this option is chosen, each Track is given its own color, and each Channel of each Track is also given its own color. The Channel colors of different Tracks will not match each other, or they will match only coincidentally.



Color by Tracks Only

When this option is chosen, each Track is given its own color, and all Channels in that Track are given the same color. This can be useful for working with MIDI files having haphazard channel assignments. (The input scheme in the Preferences window looks the same as *Tracks & Channels*.)

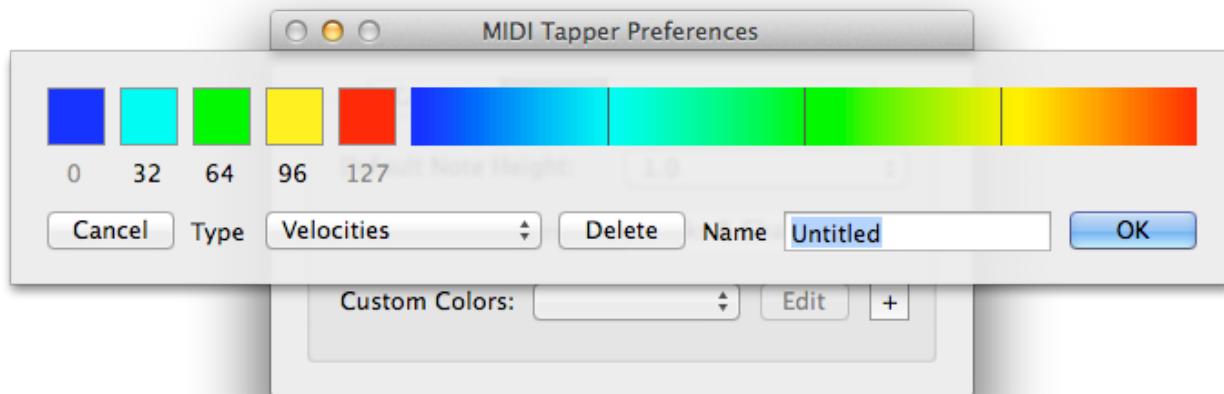
Color by Channels Only

This scheme gives unique colors to Channels of the same number, regardless of Track. This can be useful for determining MIDI output options, since output is limited to 1 MIDI port having 16

Channels. (The input scheme in the Preferences window looks the same as *Tracks & Channels*.)

Color by Velocities

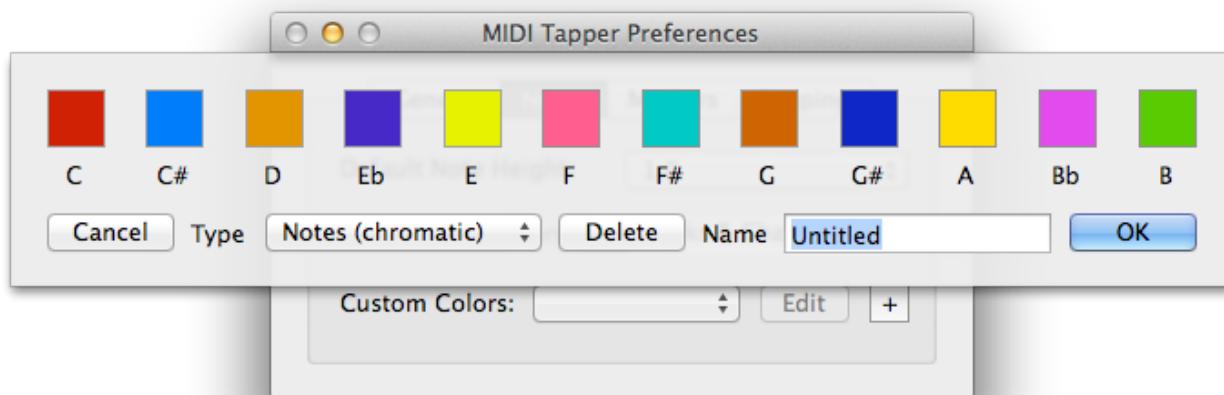
MIDI Velocity values range from 0 to 127, where a value of 0 means the note does not sound at all. Representation of these values by color is done using a gradient of five colors with three moveable “hotspots”.



To change the position of a “hotspot”, simply click and drag the number under any of the three inner boxes. This is useful for assessing the velocity distribution of a Take at a glance, and can be helpful when working with *Velocity Scaling* (see Chapter 2).

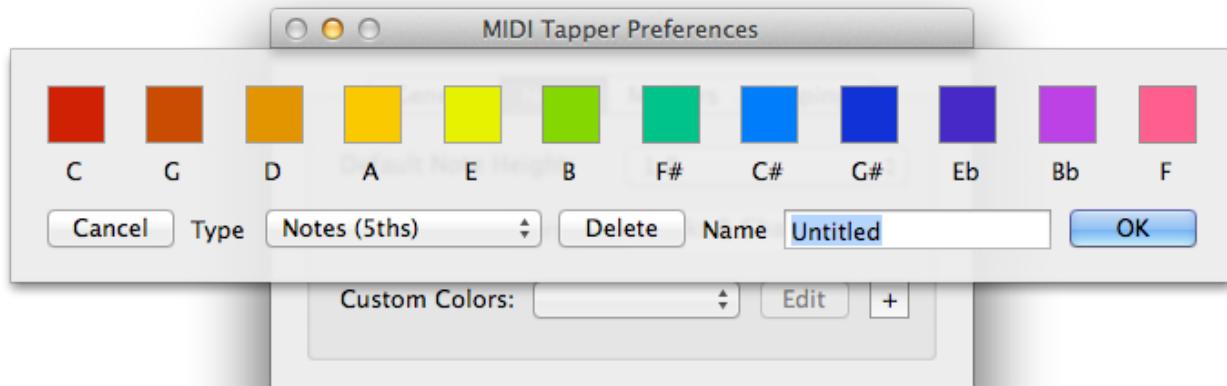
Color by Notes (chromatic)

When working with files that have all notes organised into only one Track and one channel, it can be useful to assign note colors by pitch. In this case a chromatic pattern is a logical option.



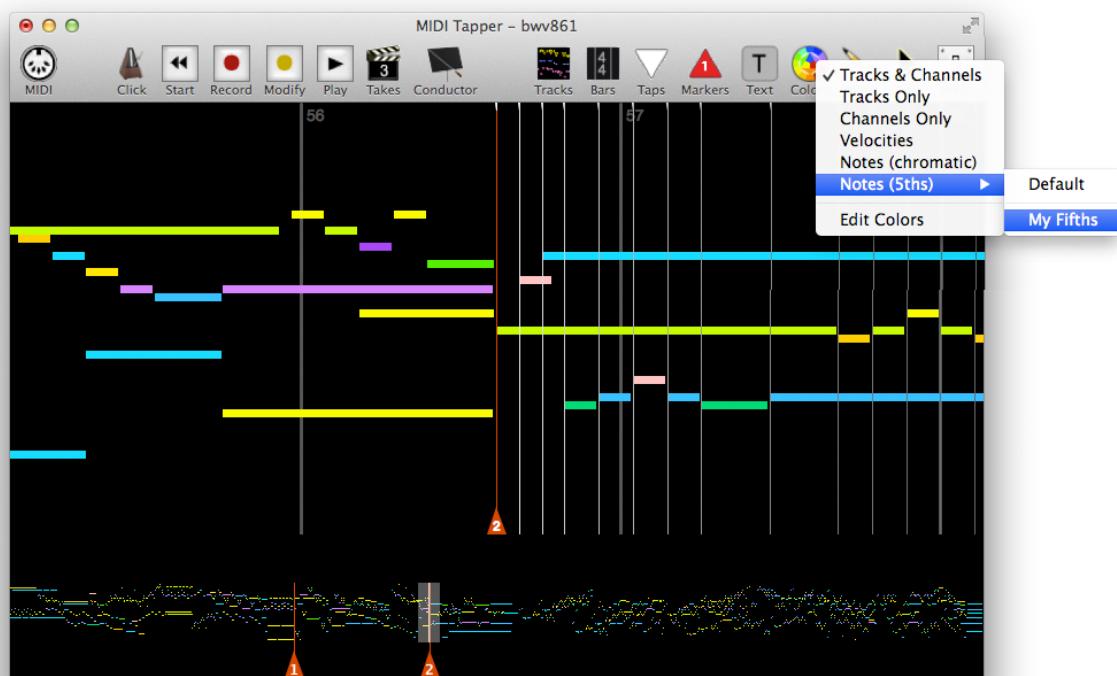
Color by Notes (5ths)

An option to assign colors according to a cycle of fifths an alternative to chromatic note coloring for projects having only one Track and channel.

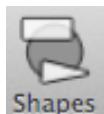


Changing the Color Display Option

The menu item **Display > Random Note Colors** can give you ideas for using various color sets. To choose colors deliberately, click the Toolbar **Colors** button to choose which Color Set you want to apply to your project at any time. Any custom Color Sets you have created are available as submenus according to the paradigm used for the Color Set. For example, below is shown a custom Color Set called “*My Fifths*”, available as a submenu under **Notes (5ths)**.



5. Note Shapes & Background Image



If display options don't interest you, it's safe to skip this chapter. MIDI Tapper defaults to displaying note data using rectangles – the traditional default shape for graphic note display in MIDI software. In addition to *Color* (see [Chapter 4](#)) and *Note Height* (see [Chapter 3](#)), different note shapes can help to reflect the character of a piece of music, giving the score a more exciting appearance which may even influence how you perform the music. Different shapes in combination can be useful for distinguishing one voice from another particularly when voices overlap. The default black background can also be replaced with an image.

Shape Groups

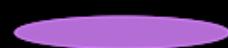
MIDI Tapper offers seven types of note shapes, with options for center or left horizontal alignment, and sometimes also with orientation and deformation options. Six shape types are shown in the table below in “large” form, followed by a large right-facing triangle and two of its type variations.

<i>Rectangle</i>	<i>Circle</i>	<i>Square</i>
<i>Diamond</i>	<i>Hexagon</i>	<i>Octagon</i>
<i>Triangle</i>	<i>... Isosceles</i>	<i>... Right</i>

Stretched vs. Large Shapes

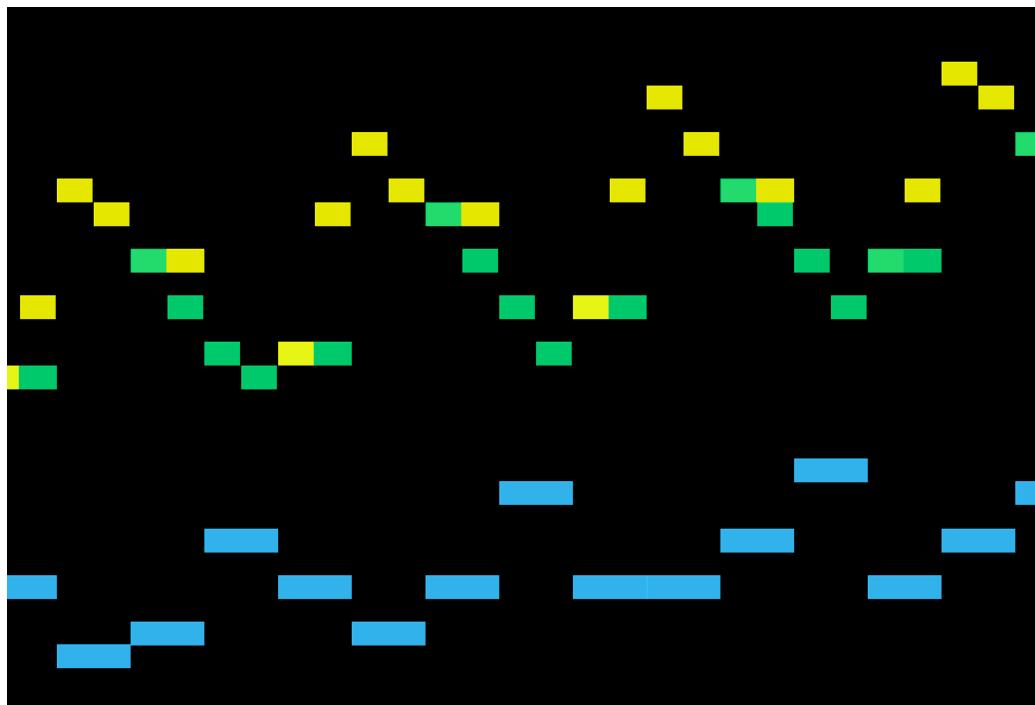
The table above shows mostly large shapes, which correspond to forms one would normally expect. Notice that among all the shapes shown, the *Rectangle*, *Isosceles Triangle*, and *Right Triangle* all occupy much less vertical space than the other shapes. This is the concept of the “stretched” shape.

The classic MIDI Note rectangle can be seen as a square that has been horizontally “stretched”. Other shapes which occupy the same vertical space as the rectangle can also be thought of as “stretched” versions of the larger regular shapes. Stretched versions of the *Circle (oval)*, *Diamond*, *Hexagon*, and *Octagon* are shown below.

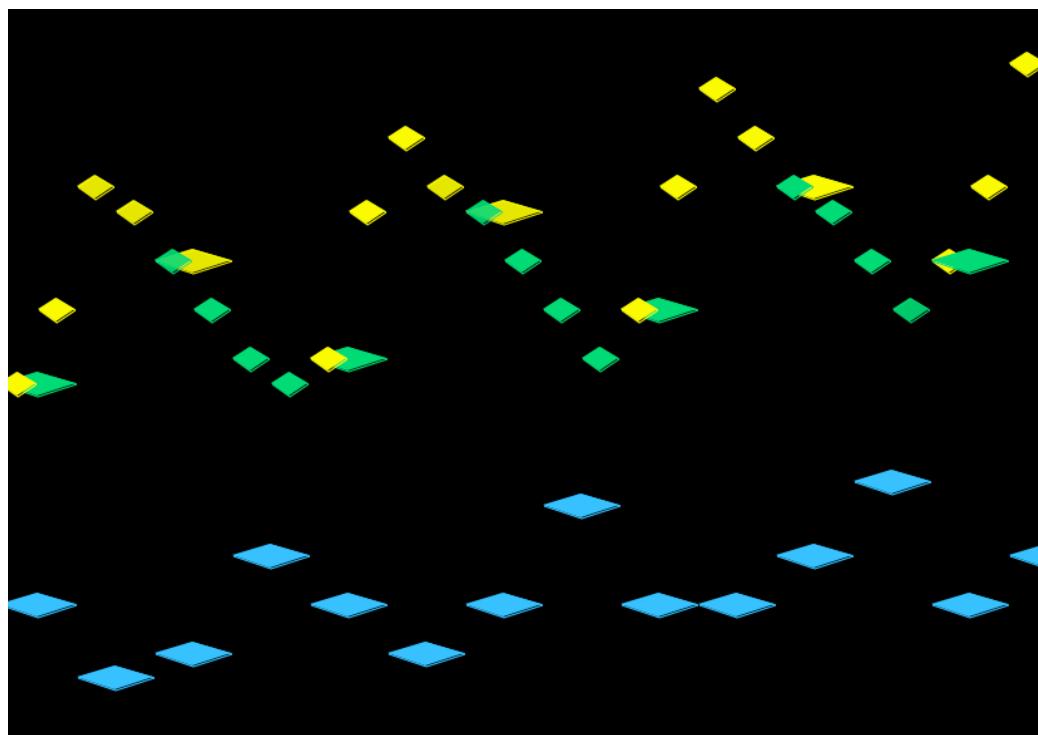
Stretched Shapes			
Circle (oval)	Diamond	Hexagon	Octagon
			

These shapes work well as replacements for the rectangle, since they occupy the same vertical space, the vertical position of the note is just as clear as when a rectangle is used. You can also change the vertical size of these shapes using the *Note Height* property (see Chapter 3) so that they appear to be “less stretched”.

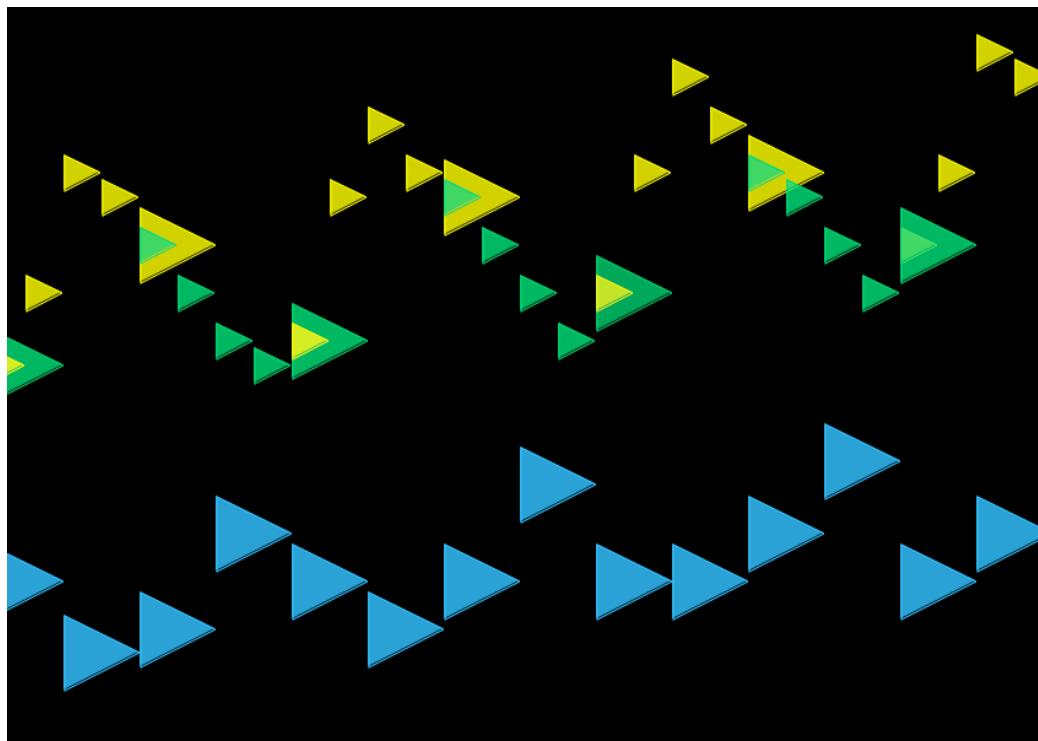
Each shape has a unique visual appeal and overlaps in different ways. Consider this passage from J.S. Bach’s *“Italian Concerto” BWV 971*, shown below in standard *Rectangles*.



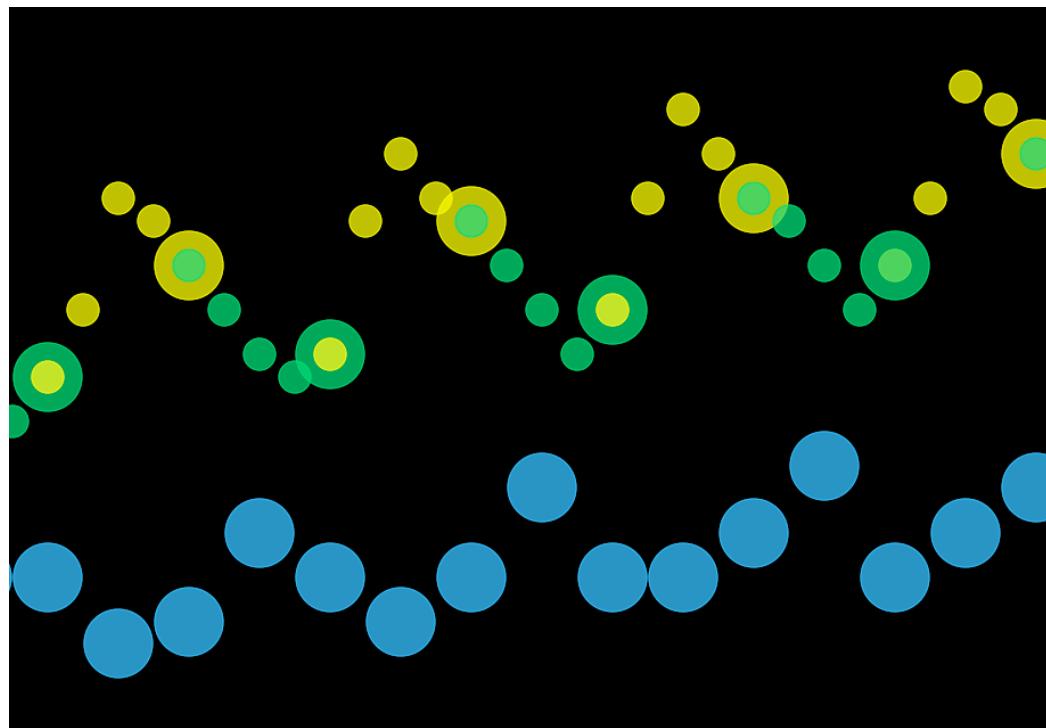
The overlapping yellow and green notes can be made more distinct by using different shapes, such as *stretched Diamonds* ...



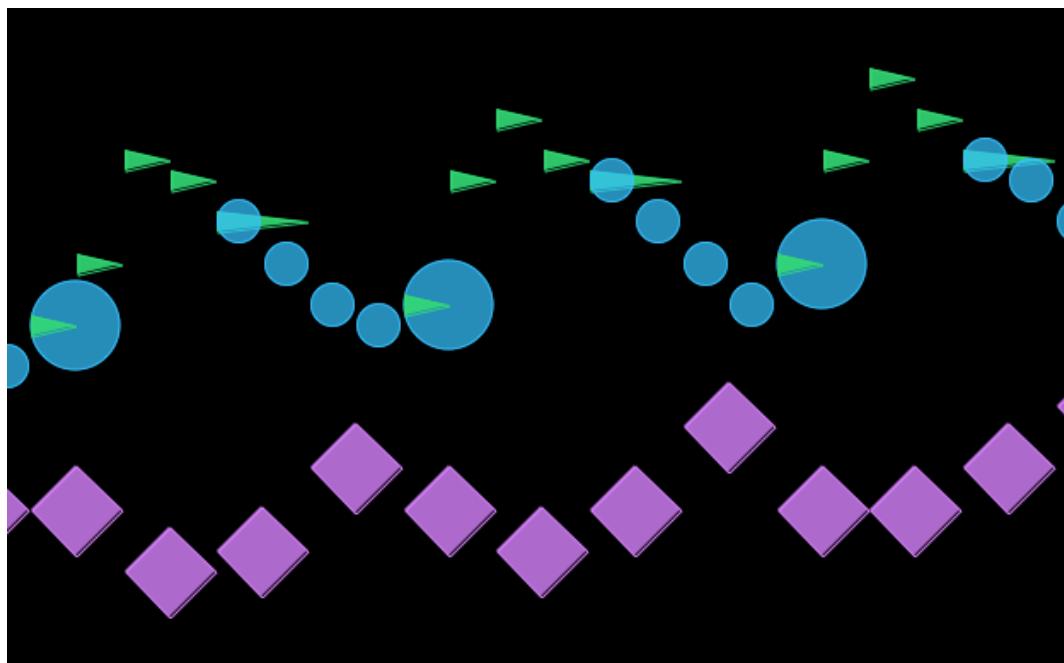
... or *Large Triangles*, left-aligned (tap lines not shown) ...



... or *Large Circles, center aligned.*

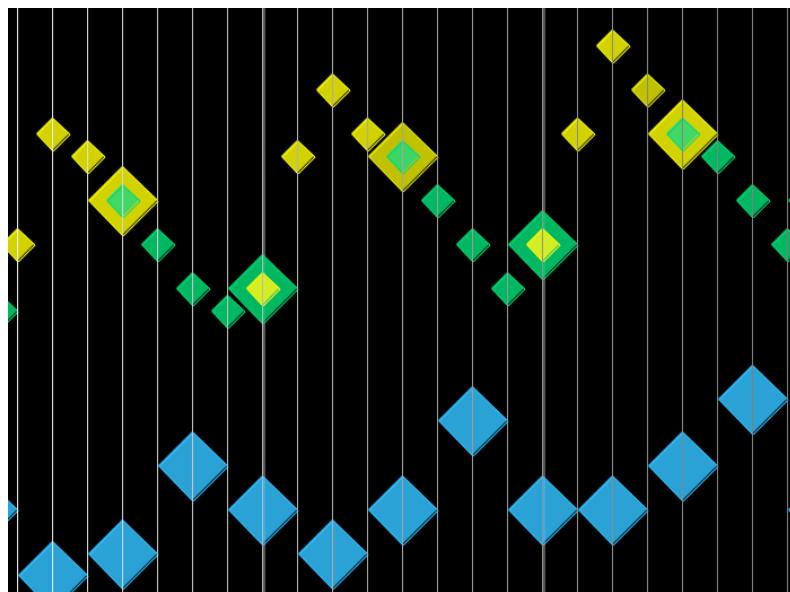


Assigning different shapes to each voice can also help to see counterpoint more clearly.

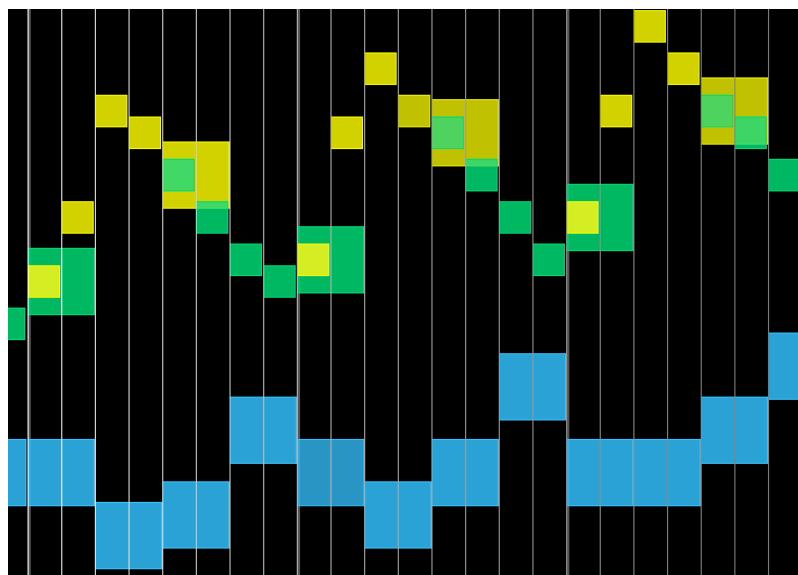


Alignment

In some of these examples, shapes are aligned on tap centers. The normal expectation is for the shape of the note to align with the onset of the note, and this is the default alignment for the classic *Rectangle*. When a shape positions its *center* at the note onset, the tap line will bisect the shape, which may sometimes be visually helpful, though note duration is not shown as intuitively as when shapes are left aligned. The passage from *BWV 971* is shown below with large *Diamonds* center aligned on the tap lines. The *Diamond* shape shows no overlapping.



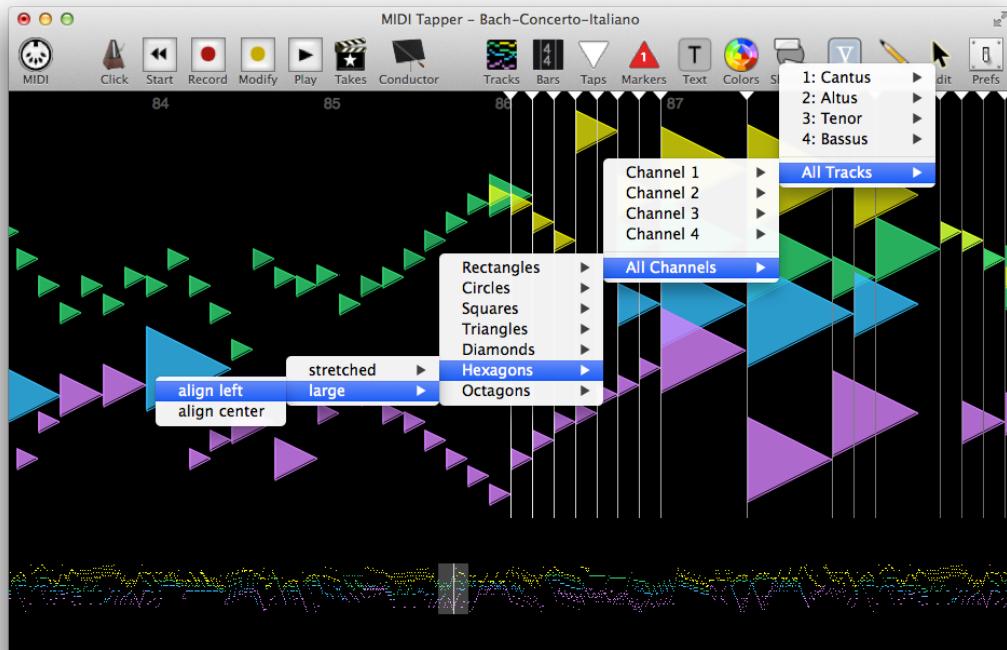
Compare this with *Squares*, *left aligned* on the tap lines, which overlap here and there.



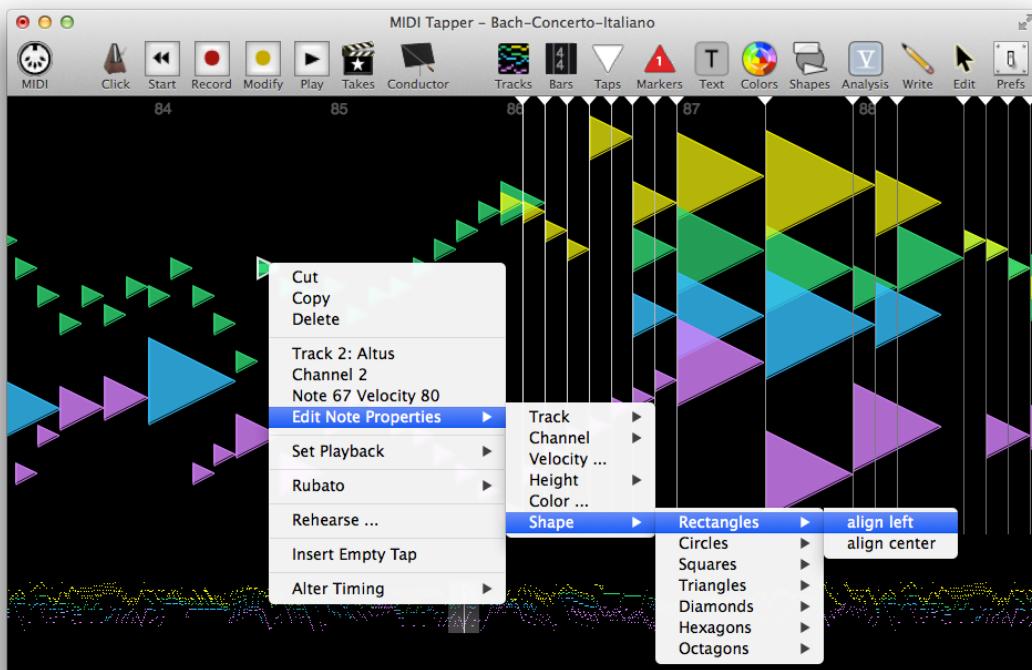
There are of course many possibilities for mixing and matching various *Shapes*, *alignments*, *Colors*, and *Note Heights*. Experiment to find out what works best for your project.

Selecting Shapes

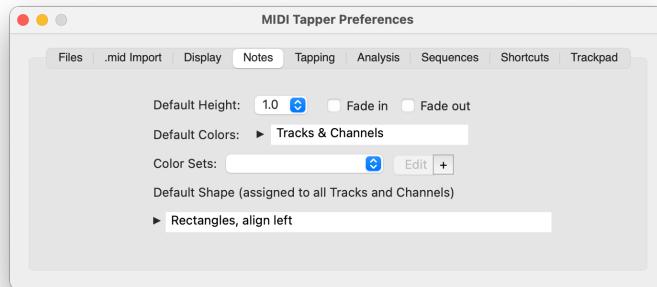
The menu item **Display > Random Note Shapes** may give you some ideas for combining shapes in different ways. Clicking the **Shapes** toolbar allows you to select shapes for each or all tracks and channels from a popup menu.



Shapes may also be set directly by *right-clicking* on any note in the Detail View, and selecting **Edit Note Parameters > Shape >**



Shapes for new projects are defined in the Preferences window under the **Notes** tab. Click the triangle to the left of the field at the bottom of the window to select your preferred default note shape.

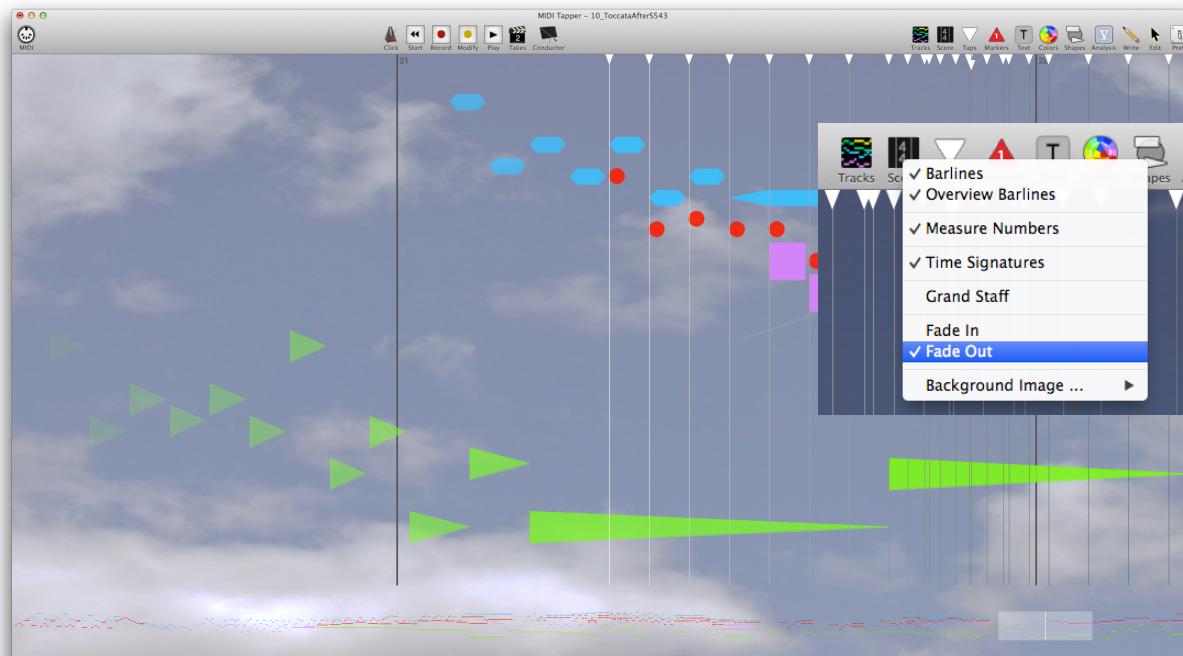


Fade In / Fade Out

Note shapes can be displayed with progressive transparency, either to “fade in” from the right side, or “fade out” on the left side, or both. Select the desired option under the **Score** toolbar item.

Background Images (.jpg or .png only)

The default black background displayed behind the notes may be replaced with a .jpg or .png image.



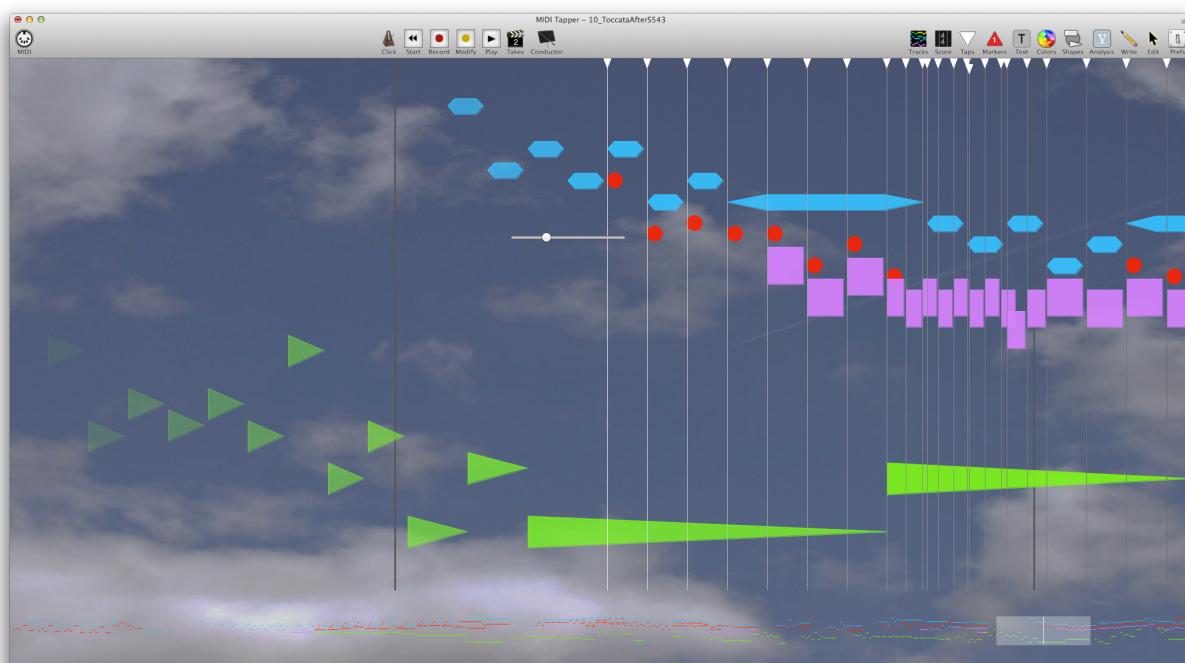
As you tap through a project, the background image will scroll very subtly from right to left. Keep in mind that busy images do not work well, since they obscure the notes. Images with large relatively uniform areas will work well (such as pictures of the sky or the ocean).

To add an image, click on the **Score** toolbar button and selecting **Background Image ...** and navigate to the image file. Note that the aspect ratio of the image is altered to fill the entire window space, so images with approximately the aspect ratio you work with will look most natural. The image should in any case be of adequate size and resolution to fill the main window. Once added, the image can be saved with the project.

To replace or remove a background image, simply **Right-Click** anywhere on the background and select **Background Image > Replace ...** or **Background Image > Delete**.

Adjusting Background Image Brightness

Many background images will need to have brightness adjusted so that note shapes are not too difficult to see. To adjust the image brightness after adding the image, **Right-Click** anywhere on the background and select **Background Image > Adjust Brightness ...** A slider control will appear and you can then adjust the brightness in real time.

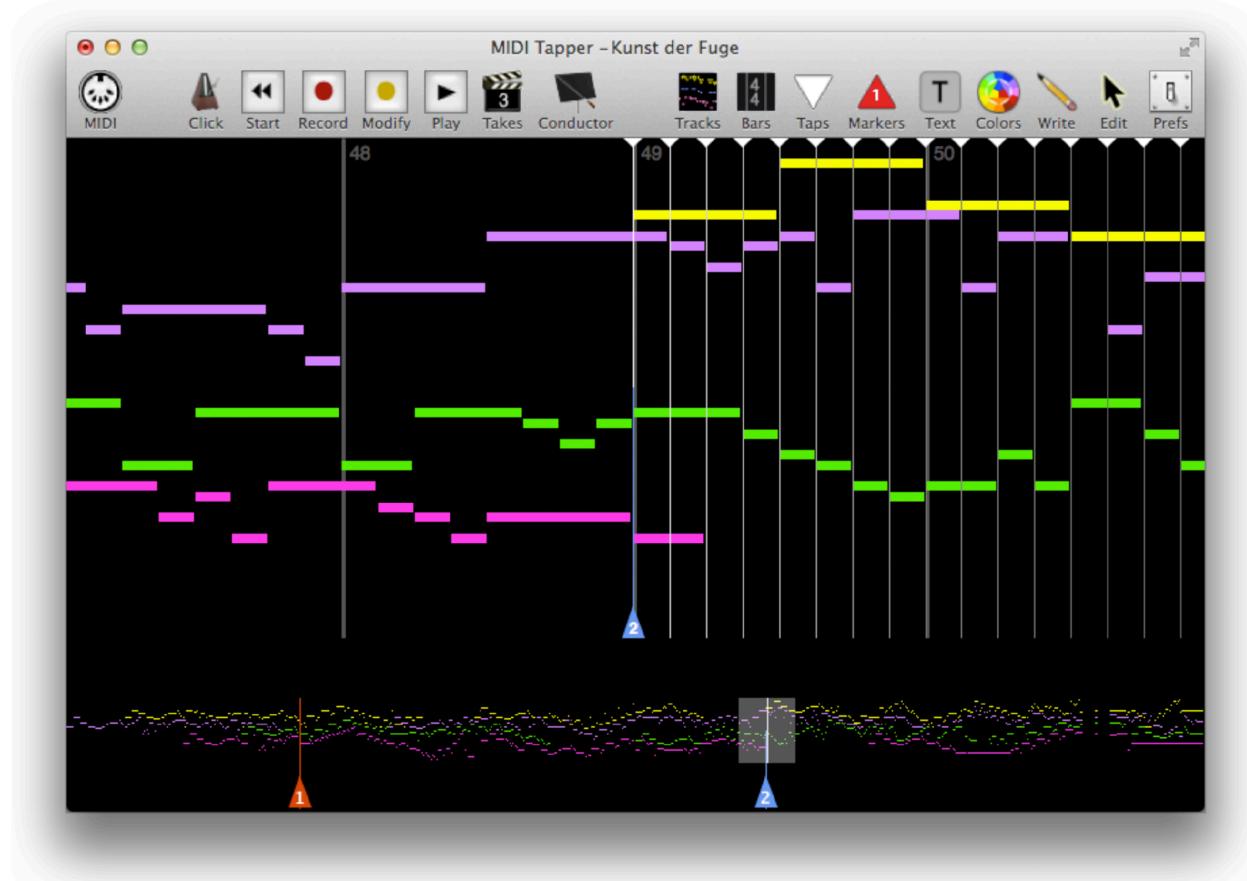


6. Marking and Annotating

Musicians often make performance notes in rehearsal scores. MIDI Tapper gives you tools to annotate your projects, so that you can perform the music as you have envisioned.

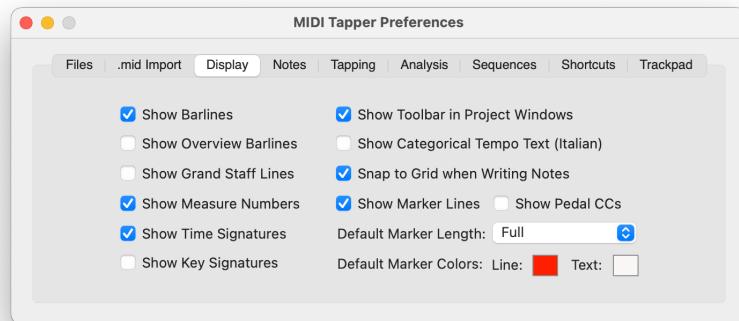
Markers

Sometimes you want to mark places in the music according to the form of the work, or to remind yourself of where to go, to get there faster. MIDI Tapper lets you do this with vertical lines having numbered triangular bases, called Markers. Markers also allow you to select large ranges of notes easily for rehearsing and editing.

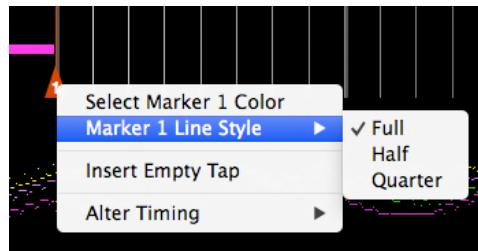


To help differentiate Markers at a glance, you can make them of different lengths and colors. Once a Marker is set, you can jump directly to the marker by typing the *number* of the marker. For example, typing 1 moves the Tap Pointer directly to Marker 1. When there is more than one Marker, you can also move from one Marker to the next using the *Command* key plus *Left Arrow* and *Right Arrow* keys.

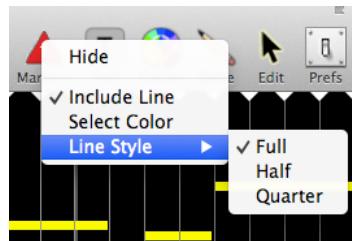
In the Preferences window you can control the default Marker length, color, and Text color, under the *Display* tab.



To add or remove a Marker, type **Command-M** or select the menu items **Markers > Set** or **Markers > Unset**. To set or unset Markers with a single keystroke, check the **Set via Enter/Return** option. The Marker will be placed at or removed from the current Tap Pointer location. After adding a Marker, its length and color can be edited by **right-clicking** on its triangle and making a selection from the popup menu.

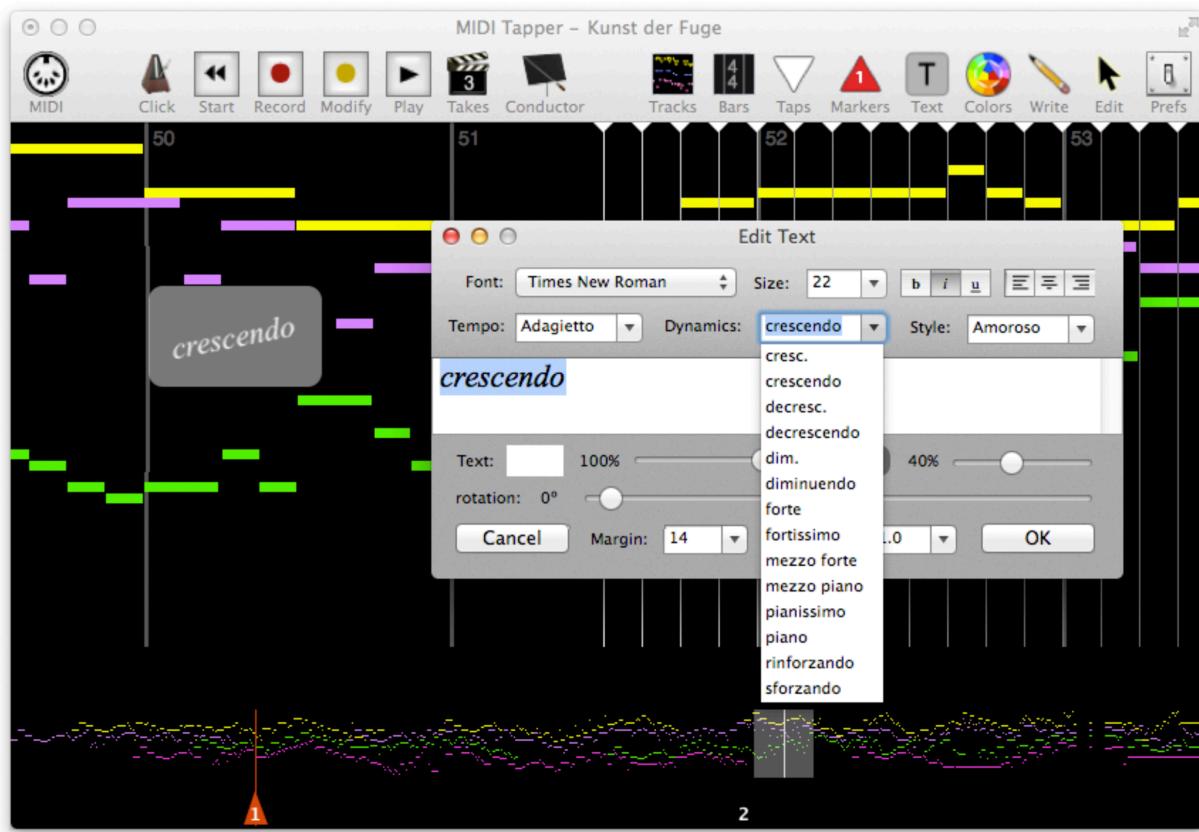


You can also hide or show all Markers, or change the working length and colors for new Markers by clicking on the Markers icon in the Toolbar.



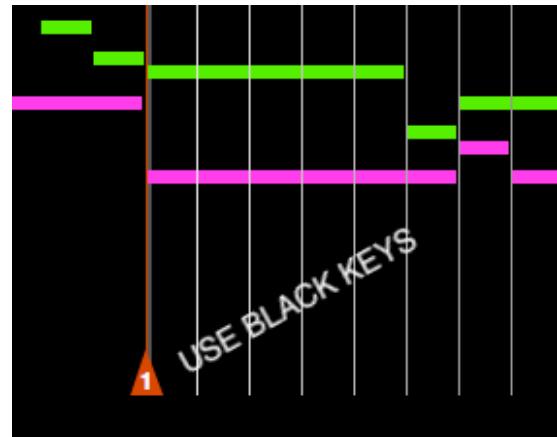
Texts

For specific, freely positionable performance reminders, Text objects are available. The Text window provides options for selecting the font, size, alignment, color, margin, line height, and rotation angle for your text. Standard musical markings for Tempo, Dynamics, and Style are included to save time in cases where you want to copy such markings from a score.



Text objects appear in a semi-transparent rounded-corner box (which can be made invisible by setting opacity to 0%). Texts and Markers can be combined to clarify performance directions, for example reminding yourself to tap a certain section on the black keys. To edit or delete a Text object, **Right-Click** the Text and select the desired option from the popup menu.

In addition to Markers and Text annotations, you may need to make changes to note durations, or you may want to have more freedom and expressivity in some passages. The next two chapters explain various ways note selections can be made and how the Tap Stream can be divided if desired.



7. Selection Basics

Grouping and ungrouping notes as discussed in **Chapter 2**, as well as other basic actions, require selecting notes. Several ways to do this are explained below.

Selecting by Marquee

The most intuitive method of note selection is simply to drag a marquee box using the mouse cursor. Notes must be completely within the box in order to be selected. You can add notes to an existing selection using the **Shift** or **Command** keys. To remove notes, use **Shift** or **Command** and marquee the notes you want to remove.

Selecting Using Menus and Shortcuts

Sometimes it takes too long to select notes only by dragging a marquee box. For these situations, the following menu items with keyboard shortcuts are available.

Menu Item	Keyboard Shortcut	Description
Edit > Select All	Command-A	Select all notes
Edit > Select All Following	Command-Option-A	Select all the notes to the right of the Tap Pointer
Edit > Select All Previous	Command-Shift-A	Select all the notes to the left of the Tap Pointer
Edit > Select From ... To	Command-Shift-Option-A	Select all the notes between two selected notes
Edit > Select Within Markers	Command-Option-M	Select all the notes between two markers, or between a marker and the beginning or end of the file

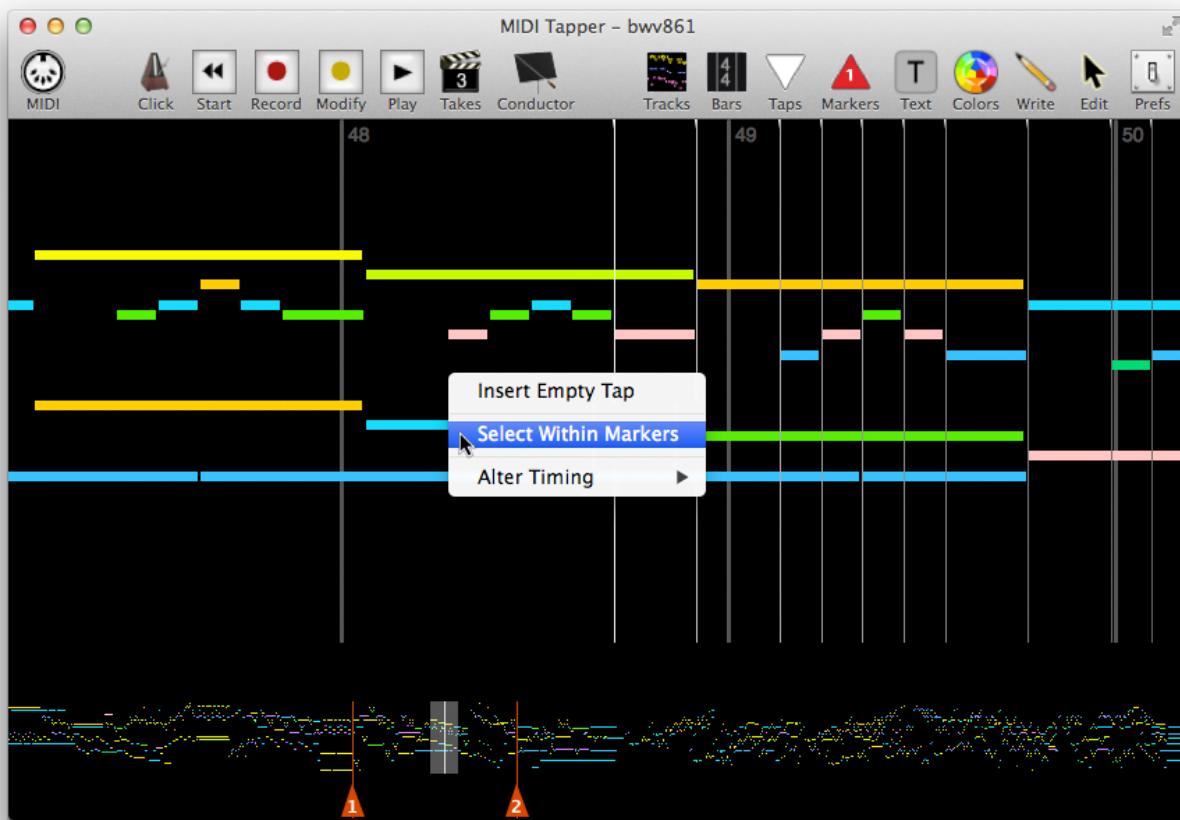
Note that **Select All Following** and **Select All Previous** and **Select Within Markers** depend on the position of the Tap Pointer.

Edit > Select From ... To

This selection option is intended for situations where a desired selection must be made from a given note to another note, but the ends of the selection do not easily fit into the Detail View. Although it is possible to resize the viewport so that a different number of notes are shown in the Detail View, often it is not the most practical option. Using **Edit > Select From ... To**, you only need to select a starting note, and an ending note. Usually this means you will select a note, then move the viewport to another location to select the other note, then use the menu option or keyboard shortcut to select all the notes in between for you.

Edit > Select Within Markers

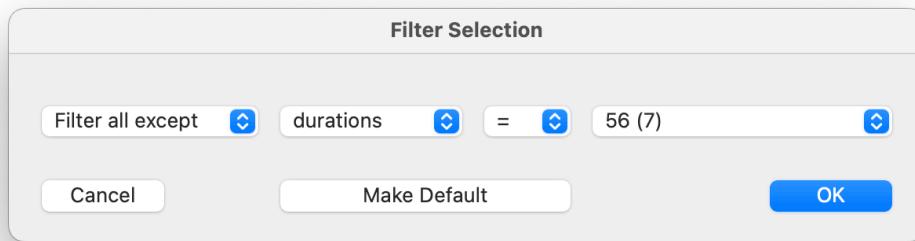
If you have added Markers to your project, you can use **Edit > Select Within Markers** or **Command-Option-M** or **Right Click > Select Within Markers** to quickly select all notes existing between one marker and the next.



Note that this function behaves as if invisible Markers exist at the beginning and end of the project, so if you position the TapPointer to the left of your first marker and choose the function, all notes from the beginning up to the first Marker will be selected. Likewise, if you position the TapPointer to the right of your last marker and choose the function, all notes from the last Marker through to the end of the project will be selected.

Edit > Filter Current Selection

You may want to select only notes that are short or long, high or low velocity, and so on, to perform some operation on them. Doing this by hand can be tedious, sometimes impossible because attributes are sometimes invisible. This menu option allows currently selected notes to be filtered according to *velocity*, *duration*, or *fringe offset*.



The filter begins with *Filter all except* or *Filter only*, to make clear what will be taken away from the current selection. The next option selects *durations*, *velocities*, or *fringes*, followed by an operator to match a value (=), or match everything except a value (!=), or various options for greater than (>) or less than (<) a value. The last menu lists all the values of the selected parameter in the selection, where the digits in parentheses give the number of notes in the selection matching that value. *Velocities* are given in MIDI values 0-127, whereas *Durations* and *Fringe Offsets* are given in milliseconds.

It is assumed that the selection filter is most useful for editing recorded takes; therefore, the values in the selection correspond to the currently active Take. If you want to work with the source data, select Take 0 before using the selection filter. The next chapter discusses a few other ways to edit the source data.

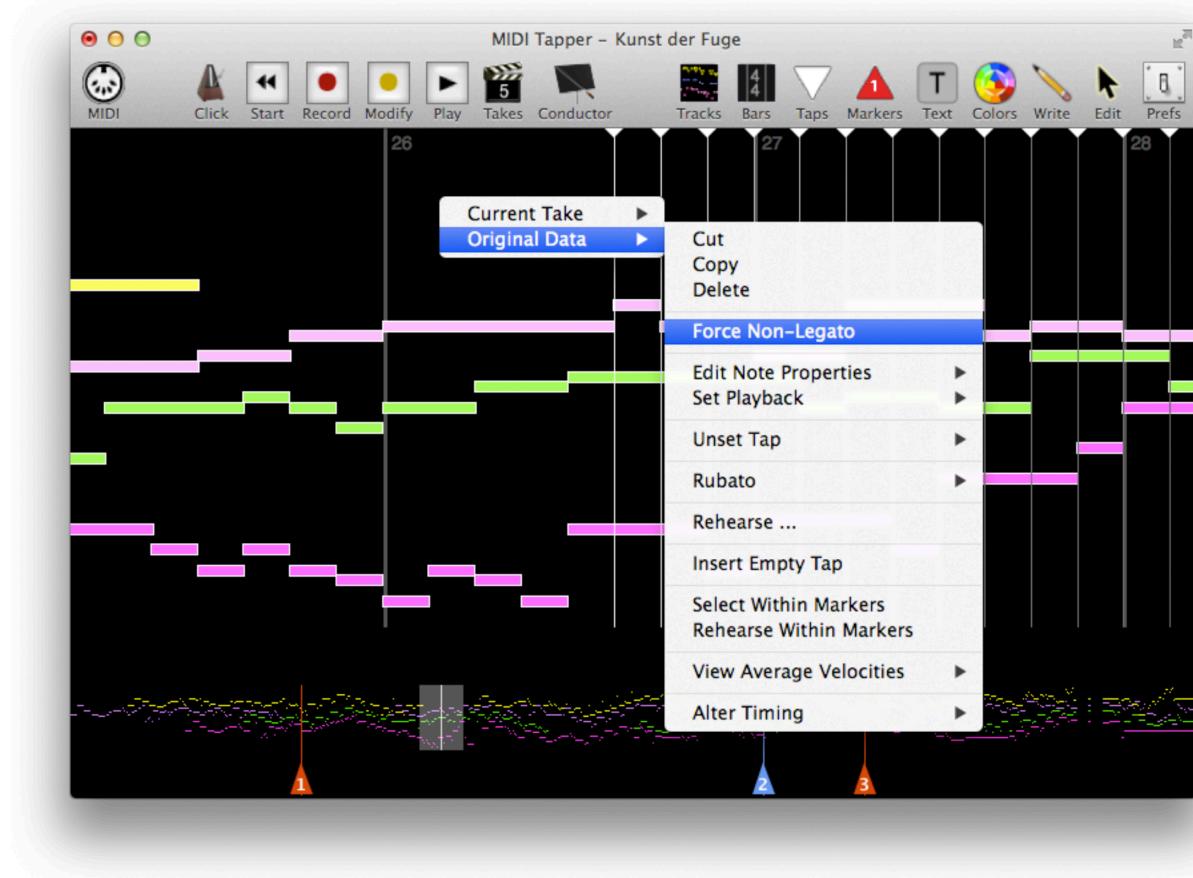
Selection filter parameter values belong to the currently active Take.

8. Source Data Editing

Although it usually makes more sense to edit the source data in the software that you use to create the MIDI file (such as music notation software) before importing it into MIDI Tapper, sometimes you may want to do some light editing of the imported MIDI data such as moving notes around, quantizing or changing durations. MIDI Tapper provides intuitive ways for doing these things. You may also sometimes want to write new notes into the score; for example, to add ornaments. A special mode called *Write Mode* is also provided for that purpose.

Legato Source Data

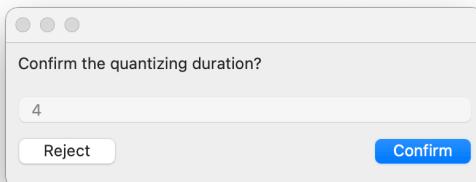
Some MIDI files are made using a 100% note length paradigm. This means that Note OFF events will happen at exactly the same time as Note ON events in the MIDI file. The output of such data is *legato* when tapped (sounding notes overlap), which will probably not be what you want. To fix this problem, use **Select All** and then **Right-Click** and select **Force Non-Legato**. MIDI Tapper will then shorten all the selected notes just enough so that Note OFF events occur before Note ON events, as would normally happen in a *non-legato* performance.



Handling Non-Quantized Source Data

Sometimes a MIDI file will be *non-quantized*, meaning that Note ON and Note OFF events are non-uniform; for example, sometimes notes will overlap for a legato effect, or sometimes notes which should happen simultaneously are arpeggiated, but not always. Such files are usually intended to more or less approximate a real performance, and are not ideal for use with MIDI Tapper, but a set of tools exists for handling such files.

To quantize Note ON and OFF events so that tapping can take place normally, select the non-quantized notes (in most cases you would simply Select All), Right-Click and choose **Quantize > Note ONs and OFFs, Note ONs only, or Note OFFs only**. To perform the operation, MIDI Tapper searches for a *quantization value*, starting with the smallest rhythmic value found in the file. The Tap Pointer will be placed at the point where this smallest value was found in the source data, and a dialog will appear, asking you to confirm or reject this value. The duration of the potential value is shown in milliseconds in the dialog field.



It is unlikely that the value you would want to use for quantization will be less than 100 (ms), but the option remains open for edge cases. If the value is small, look closely at the location of the Tap Pointer to see what MIDI Tapper has found. It may be a place in the file where notes are overlapping for a legato effect. Each time you reject a proposed value, the software searches for the next *larger* possible value. Continue rejecting values until MIDI Tapper has found the smallest note duration suitable for quantizing.

Editing Note Properties

Please see Chapter 3 which covers this subject as well as how Tracks and Channels impact the way you work with Source Data.

Drag-Editing Notes

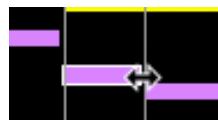
When you mouse over a note, it appears illuminated, and the cursor changes to an open hand icon. You can then click on the note and drag it up or down to change its vertical position (*Pitch*), or reposition the note horizontally by holding down the **Shift** key and dragging the note left or right. Hovering over the right edge of the note changes the cursor to left/right arrows, allowing you to change the note's *Duration* by dragging the edge to the left or to the right. Hovering over the left edge of the note with the **Shift** key held down also changes the

cursor to left/right arrows, and dragging this edge changes the recorded attack time (*Fringe Offset*). A rectangle will appear when notes have been assigned other shapes.

Over note : Position



Over right edge : Duration



Over left edge : Fringe Offset*



* The Shift key must be held down to activate the double-arrow mouse icon, which then allows moving the left edge (Fringe Offset) of the note.

Mouse	Action	Changes
<i>over note</i>	<i>Click & Drag Vertically</i>	<i>Pitch</i>
<i>over note</i>	<i>Hold Shift, Click & Drag Horizontally</i>	<i>Rhythmic placement</i>
<i>over right edge</i>	<i>Click & Drag Horizontally</i>	<i>Duration</i>
<i>over left edge</i>	<i>Shift on hover (only)*, then Click & Drag Horizontally</i>	<i>Fringe Offset</i>

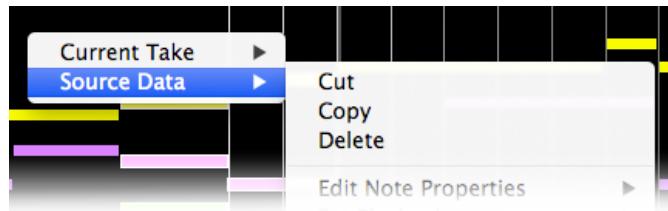
Copying, Cutting, Pasting, or Deleting Notes

Notes can be copied, cut, or pasted using the standard edit menu items and shortcuts, or through the Detail View **Right-Click** menu. Deleting notes is also available from both menus, but does not have a corresponding keyboard shortcut.

Action	Keyboard Shortcut
<i>Cut</i>	<i>Command-X</i>
<i>Copy</i>	<i>Command-C</i>
<i>Paste</i>	<i>Command-V</i>
<i>Delete</i>	<i>(none)</i>

When a Take is selected in the toolbar (the Clapboard icon displays a number), these standard editing options are only available from the **Right-Click** menu under the **Source Data**

submenu. If you need to edit the source data after having recorded a Take, see **Chapter 8** for important concerns that must be considered in that situation.

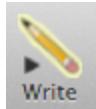


Split & Merge Notes

When editing there may be cases where you need to convert (split) one note into two notes, or you may want to combine (merge) two notes into one note. Simply select the notes you want to split or merge and **Right-Click** to open the edit menu, then select **Split Notes** or **Merge Notes** under the **Source Data** submenu.

Quick shortcuts: make a selection and type **Shift + s** to split, **Shift + m** to merge.

Write Mode



Click on the Write toolbar button to enter **Write Mode**. As a shortcut, you can also simply type **W** on the computer keyboard. Once in Write Mode, the Write toolbar button is illuminated and includes a disclosure triangle as shown at left.

When you click the Write toolbar button while in Write Mode, a popup menu appears with options to select the MIDI Track and Channel in which to write. The **Snap To Grid** controls whether notes written will automatically position themselves into rhythmic subdivisions or not. This option is also a global setting you can change in the **Preferences**.



The Write Mode Toolbar

In Write Mode, a semi-transparent toolbar appears at the top of the Detail View with items for writing individual notes, ornaments, and MIDI Events.



Select items in the toolbar by clicking on them, or by typing shortcut keys on the computer keyboard. The upper left corner of each item in the toolbar shows the shortcut key which selects the item. Each item is explained in the table below.

Item	Description	Shortcut	Function
	Cursor	C	<i>Temporarily edit while remaining in Write Mode</i>
	Whole Note	1	<i>Prepare to write a Whole Note</i>
	Half Note	2	<i>Prepare to write a Half Note</i>
	Quarter Note	4	<i>Prepare to write a Quarter Note</i>
	8th Note	8	<i>Prepare to write an 8th Note</i>
	16th Note	6	<i>Prepare to write a 16th Note</i>
	32nd Note	3	<i>Prepare to write a 32nd Note</i>
	Trill	5	<i>Prepare to write a new Trill, or add a Trill to an existing note</i>
	Pralltriller	7	<i>Prepare to write a new Pralltriller, or add a Pralltriller to an existing note</i>
	Mordent	9	<i>Prepare to write a new Mordent, or add a Mordent to an existing note</i>
	Turn	0	<i>Prepare to write a new Turn, or add a Turn to an existing note</i>
	MIDI Event	M	<i>Prepare to write a MIDI Event</i>
	Exit	X	<i>Exit Write Mode and return to Edit Mode</i>

Editing While Remaining in Write Mode

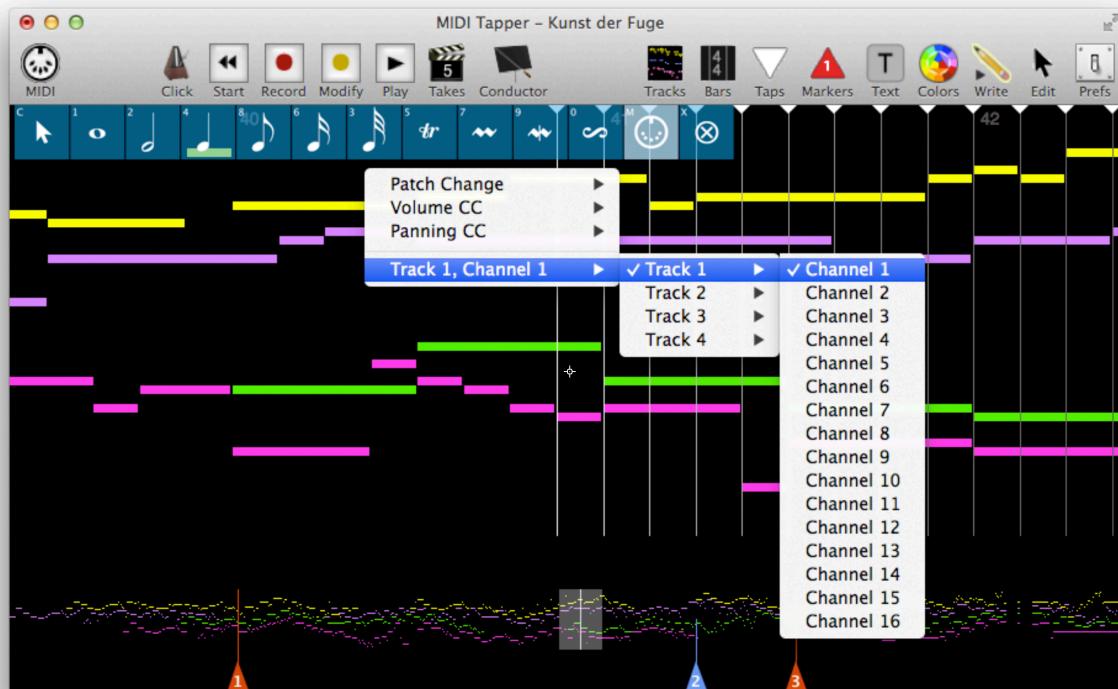
As you work in Write Mode, you may want to also do some editing as you go, such as drag-repositioning notes, or dragging note durations, etc. The **Cursor** icon allows you to do this without the worry of accidentally writing new notes, and without the hassle of having to switch out of Write Mode back into Edit Mode.

Writing Notes

To write a note, simply select the desired duration, and then click in the Detail View where you want the note to be placed. The various note Durations, from Whole Note to 32nd Note, are calculated according to the meter at that point in the MIDI file. MIDI Tapper displays a graphic notation where the lengths of notes are proportional, so that for example a Half Note takes up half the horizontal space as a Whole Note. Keep this in mind as in some cases depending on the width of the Viewport, you may select note values which will be drawn partially beyond the current Detail View. Notes can be repositioned and durations changed after being written; however, be sure to switch to the Cursor icon (type C) before dragging.

Writing MIDI Events

When you have selected the **MIDI Events** item in the Write Mode toolbar, clicking with the Pencil Cursor anywhere in the Detail View opens a popup menu from which you can select **Patch Change**, **Volume CC**, or **Panning CC** events. Before adding an event, be sure first to select the desired Track and Channel for the event.



Writing Ornaments

MIDI Tapper has four built-in ornaments: *Trills*, *Pralltrillers*, *Mordents*, and *Turns*. These ornaments can be written alone, or added to existing notes. Each ornament consists of a group of note values related to the meter of the imported MIDI file. *Trills* consist of 7 notes (or you can choose an option to trill the entire length of an existing note), *Pralltrillers* and *Turns*

- 16th
- 16th triplet
- 32nd
- ✓ 32nd triplet
- 64th
- 64th triplet
- 128th
- 128th triplet
- 256th
- 256th triplet

each 3 notes, and *Mordents* 2 notes. The duration of the notes added by an ornament is selectable via a *right-click* popup menu. The selected duration applies to all ornaments.

Trills, *Pralltrillers*, and *Turns* are written starting *above* the main note; only the *Mordent* starts *on* the main note. To add an ornament to an existing note, simply select the ornament tool and click an existing note, keeping in mind that that note serves as the *main note* for the ornament.

Ornament	Begins	Notes	Example Preview
<i>Trill</i> 	<i>above the note</i>	<i>7 or full length of note</i>	
<i>Pralltriller</i> 	<i>above the note</i>	3	
<i>Mordent</i> 	<i>on the note</i>	2	
<i>Turn</i> 	<i>above the note</i>	3	

Ornaments are written diatonically in the key suggested by the surrounding notes.

While Mordents are short enough to be tapped without much difficulty, trills and turns present special challenges. These ornaments are often better performed separate from the main Tap Stream. The next chapter explains how this can be done in MIDI Tapper using *Rubatos*.

9. Separating Hands – Rubatos

MIDI Tapper provides *Rubatos* as a way to add more flexibility and natural expression to trills, turns, and other free ornaments or cross rhythms which may be difficult to perform, or may sound too “square”, in a single Tap Stream.

A **Rubato** is a sequence of notes assigned to its own Tap Stream, optionally looped, and played only with specific keys of the MIDI controller that you assign.

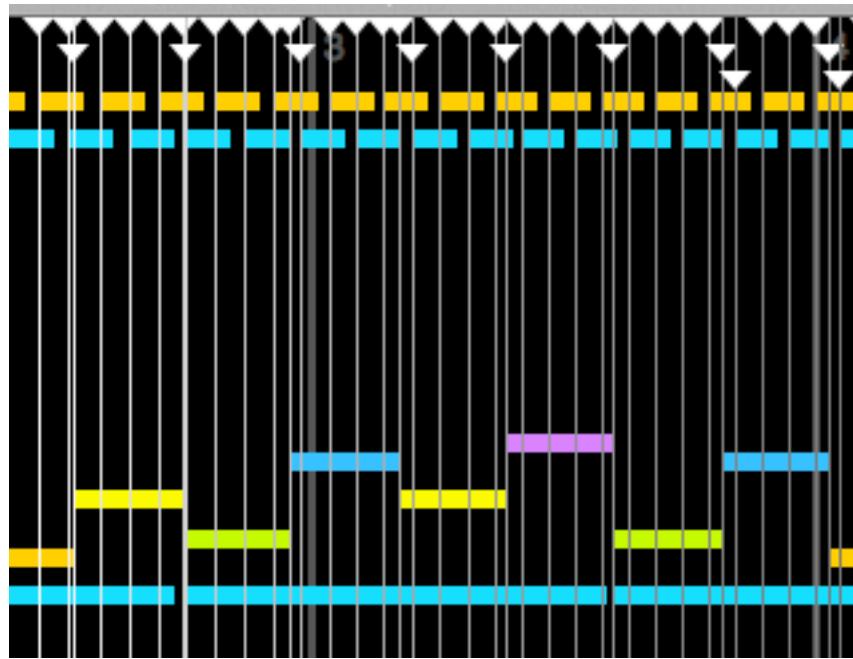
For example, Bach's *Prelude in G Minor BWV 861* from the *Well Tempered Clavier, Book 1* begins with a trill in the right hand over constant sixteenth and eighth notes in the left hand.



This music has been realised in a MIDI file as shown below when imported into MIDI Tapper.



In order to sound natural and musical, the notes of the trill occur *slightly out of time* or *slightly unmetered*, resulting in a complex tap stream, as can be seen in the close-up below.

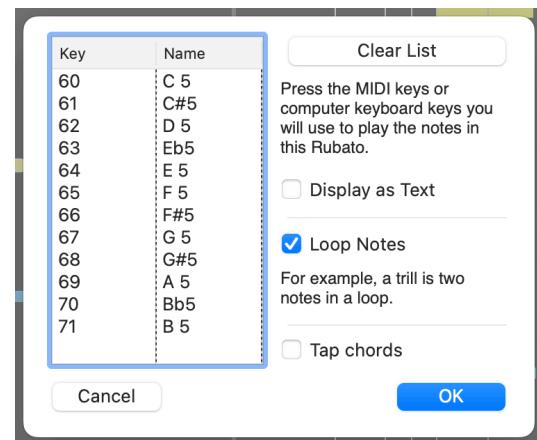


This complex Tap Stream presents obvious performance difficulties. The lower notes should be played in more-or-less steady rhythm, while the upper voice should be played in free rhythm, but trying to tap the given Stream results neither in steady lower voices, nor in a free upper voice. The solution is to assign the upper notes (the notes in the trill) to a Rubato, separating those notes from the Tap Stream.

Creating a Rubato

A Rubato is created as follows:

1. Select the notes that you want to be able to play freely outside of the Tap Stream
2. Choose the menu item **Rubato > Set** or type **Command-R** or **right-click** and select **Rubato > Set Rubato**. A dialog window then appears to define the Rubato.



Assigning Input Keys

The table in the Rubato window with the headings **Key** and **Name** is a list of MIDI keys on your MIDI input device which are assigned to the Rubato. Once assigned, tapping those keys in the list will not move the main Tap Stream forward. Instead, tapping those keys will move through the Rubato in a separate independent Tap Stream.

A default set of MIDI input keys is given: the middle octave of the keyboard from middle C, chromatically up to the B above it. To assign a different set of keys, click **Clear List**, and simply play the keys on the MIDI controller that you want to use to tap through the Rubato.

Looping Notes

The notes selected for the Rubato can be assigned to operate in a loop, so that once you reach the last selected note, the Rubato Tap Stream will start over at the first note of the Rubato. This is useful for trills.

Displaying As Text

The MIDI input keys assigned to tap through the Rubato can be displayed as a Text object to remind you which keys you have assigned to tap through the Rubato.

Rubato “Tap chords” Option

By default the notes assigned to a rubato must all be played individually, since the core idea of rubato playing is to have control over every note independent of the tap stream. Checking the “Tap chords” option groups the notes of the rubato together, effectively creating a second tap stream. This option is used for ***Two-Handed Tapping*** (see below).

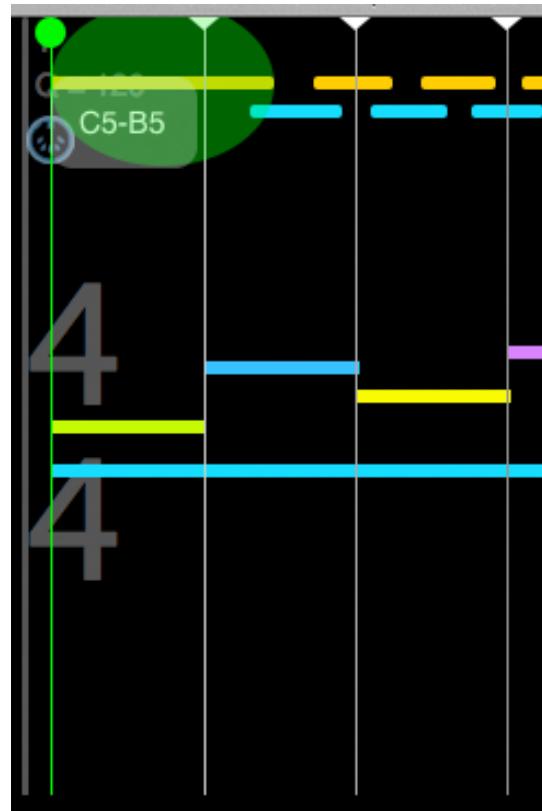
After assigning input keys and selecting the other options, click OK to set the Rubato.

Appearance of a Rubato

A Rubato is distinguished visually in the Detail View in the following ways.

1. The notes of the Rubato are drawn with rectangles having rounded corners.
2. The Tap line at the start of a Rubato is green, and has a circle at the top rather than a triangle.
3. The notes of the Rubato are illuminated with a transparent green oval drawn over each note, moving from one note to the next as you tap through the Rubato.

At right is shown the opening trill from BWV 861 prepared with a Rubato using default input keys, loop option, and reminder Text object.



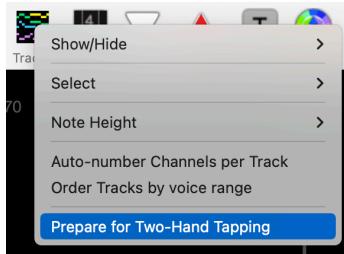
Tapping With Separate Hands Through a Rubato

The first tap of a Rubato can include any number of notes outside of the Rubato in its Tap Group. Each subsequent tap using any of the input keys assigned to the Rubato plays back only the notes in the Rubato, and does not move the Main Tap Stream forward. Tapping any other MIDI input keys (any keys not assigned to the Rubato) moves the Main Tap Stream forward, independent of the Rubato. Once the Main Tap Stream has surpassed the right end of the Rubato, the Rubato stops whether you have reached the end of it or not, and normal Tapping resumes. In other words, there are two separate and independent Tap Streams, with the Rubato Tap Stream determining the start of the separation, and the Main Tap Stream determining the end of the separation.

After you have tapped through a given piece of music, annotated it and assigned Rubato passages as needed, you may want to rehearse any difficult passages. A special mode for this purpose is explained in the next chapter.

Two-Handed Tapping

There may be cases where you want to tap two streams separately and simultaneously throughout an entire piece. If the source MIDI file has only two tracks, MIDI Tapper provides a quick way to do that, by clicking the Tracks toolbar item and selecting **Prepare for Two-Handed Tapping**.



One entire track will then be assigned to a **Rubato**. The notes assigned to the **Rubato** can then be edited by selecting any of the notes in the **Rubato** track, **right-clicking** and choosing the menu item **Rubato > edit Rubato**.

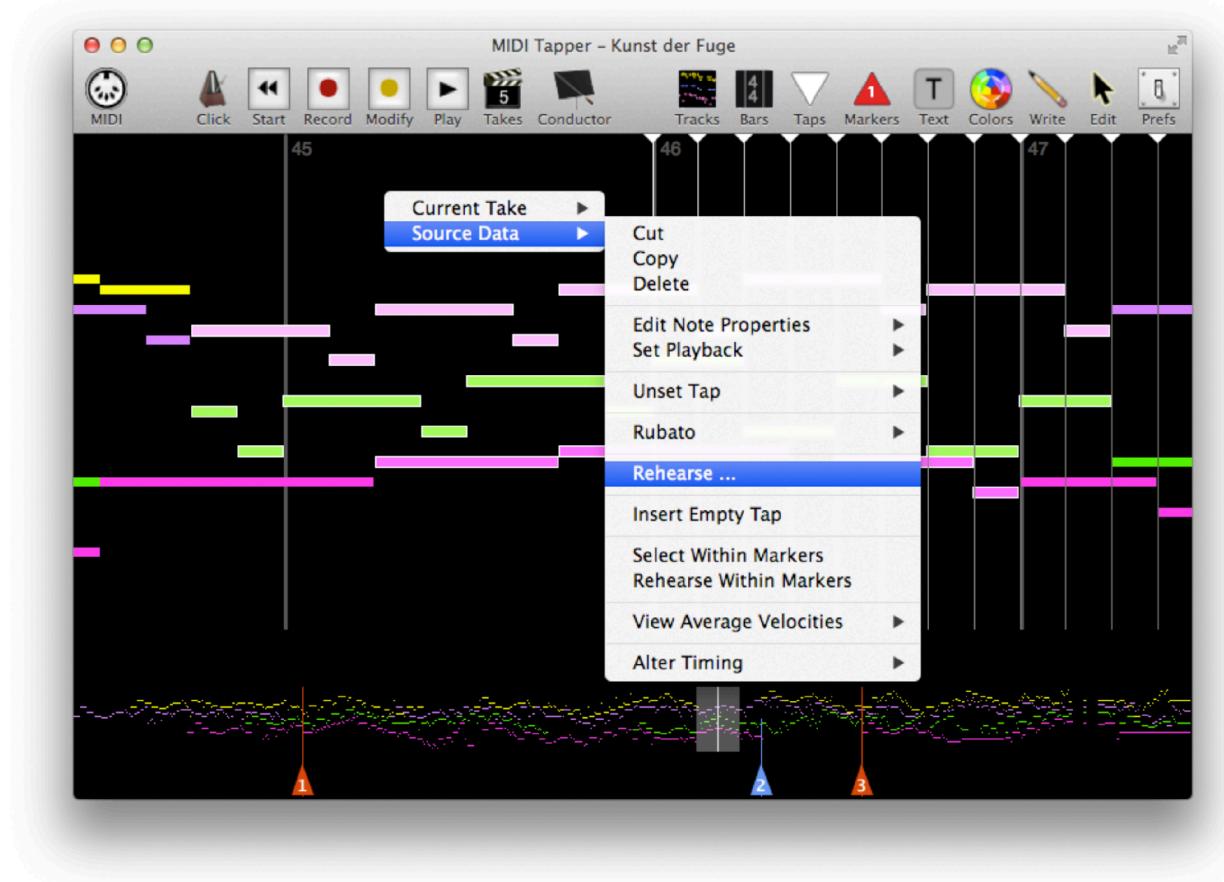
To use this feature with files having more than two tracks, first select all the notes of the additional tracks, and assign them to tracks 1 or 2. You may also want to use the menu option **Order Tracks by voice range** before preparing for two-handed tapping.

10. Rehearsal Mode

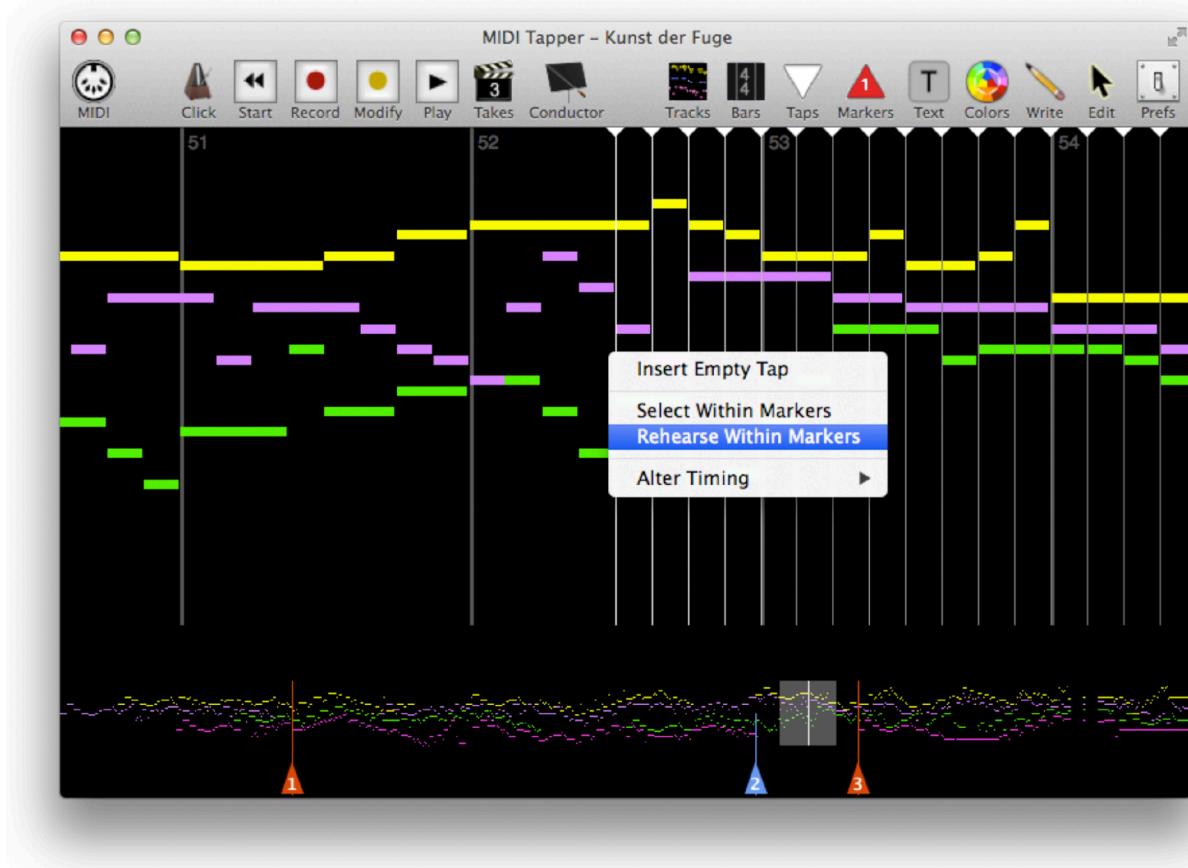
A typical part of practicing music involves isolating difficult passages and playing through them many times, usually starting slowly and then increasing the tempo to performance level. When making recordings, sometimes it is also useful to record a passage many times in a row and then choose the best version to splice into the final recording (see [Chapter 12](#)). In MIDI Tapper, this kind of practice and recording technique can be done in *Rehearsal Mode*.

Entering Rehearsal Mode

To rehearse a short passage in which all the notes fit into the detail view, begin by selecting all the notes in the passage. The different ways to select notes are outlined in [Chapter 7](#). Marquee selection is an intuitive method. After the notes are selected, choose the menu item **Edit > Rehearse Selection**, or **right-click** and choose **Rehearse ...** Beware that when the Take toolbar button shows a number rather than a star (when a Take is selected rather than the source data), the **Rehearse** option will be listed under **Source Data > Rehearse**.



For longer passages, when the music does not all fit into the Detail View, place markers at the start and end of the passage, and use **right-click > Rehearse Within Markers**.

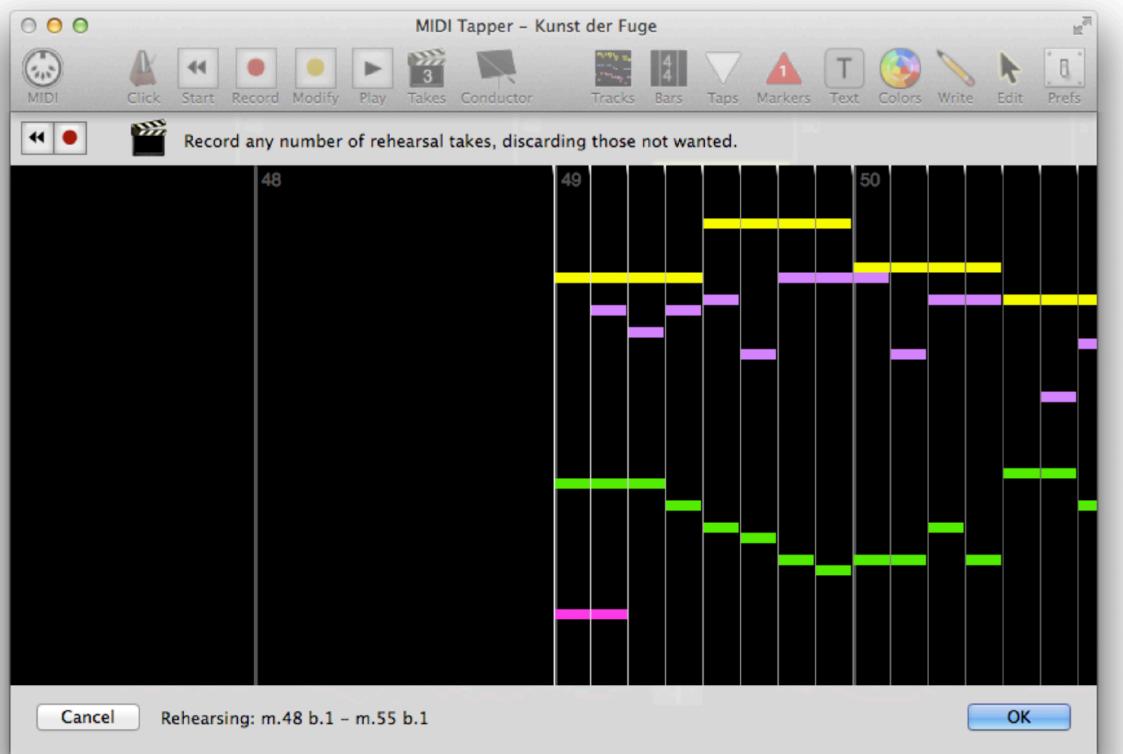


Once **Rehearse ...** or **Rehearse Within Markers** has been selected, the Rehearsal window will open, showing the passage along with a transport in the upper left and a clapboard icon for managing Rehearsal Takes. Measure information is also given at the lower left.

The main toolbar becomes unavailable during rehearsal mode. If changes need to be made to MIDI input or output, they must be made outside of Rehearsal mode.

Rehearsal Tapping

Once in Rehearsal Mode, you can tap through the passage as many times as you like. When you reach the end of the passage, the Tap Pointer automatically loops back to the beginning of the passage, so that you don't have to break your flow.



Rehearsal Takes

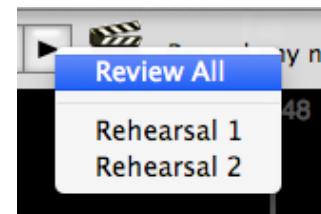
There are many reasons you may want to record many versions of the same passage. The passage may be particularly difficult, or you may be unsure what kind of performance interpretation you want, or you may have a clear vision for the passage and you want to be able to catch the most inspired version of that vision without having to stop and start, click transport buttons, and lose your flow during the process. That is what Rehearsal Takes are for.

Recording Rehearsal Takes

 Click the Record button to record any number of Rehearsal Takes. When you reach the end of the passage, the Tap Pointer returns to the start of the passage, and a new Rehearsal Take begins recording, so you don't have to break your flow.

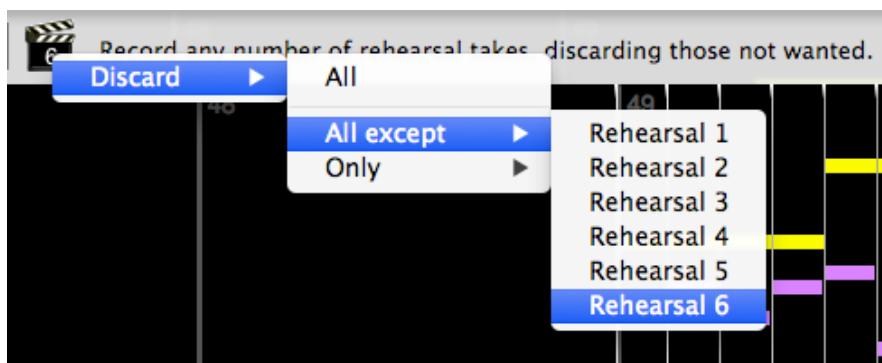
Reviewing Rehearsal Takes

Once you have recorded Rehearsal Takes, you may want to listen to them all or individually to evaluate or compare them. The Play button provides a popup menu for this purpose.



Discarding Rehearsal Takes

Recording many Rehearsal Takes is a way of working that leads to throwing many versions away. It is possible that through this process you approach your ideal performance, in which case you want to keep only the last of many Rehearsal Takes. Or, you may record many Rehearsal Takes, and then decide that none of them are worth keeping. In either case it would be tedious to have to manually delete every unwanted Rehearsal Take. The Rehearsal Takes Clapboard icon provides menus for these situations. You can easily discard all Rehearsal Takes, discard only one of them, or discard all but one of them.



Exiting Rehearsal Mode

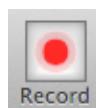
The Rehearsal Window includes two buttons marked **Cancel** and **OK**. When using the mode for tapping practice only, it does not matter which of these buttons is clicked to exit; however, it is very important to note that clicking **Cancel** will discard all Rehearsal Takes, and clicking **OK** will pass all remaining Rehearsal Takes to the Main Window, so that you can splice those takes into your final recording if you want to.

If you want to keep any Rehearsal Takes upon exiting, click **OK**.
If you want to discard all Rehearsal Takes on exit, click **Cancel**.

11. Working With Takes

Anyone familiar with music or film recording understands the concept of the *Take*. A Take can be defined as *a performance caught in one session or attempt, or a sequence recorded continuously at one time*. More often than not, a Take will be only a part of a larger piece, although sometimes recordings are done in a single take. Unless you are someone who never makes mistakes, managing multiple takes will be a core aspect of the work you do when using MIDI Tapper to create recordings.

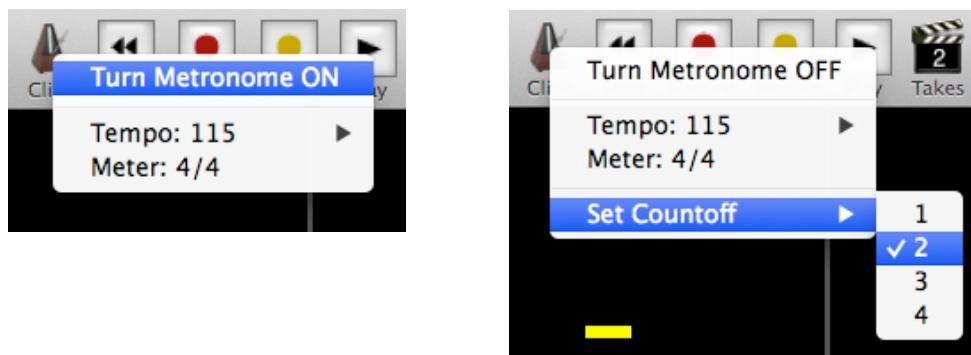
Recording a Take



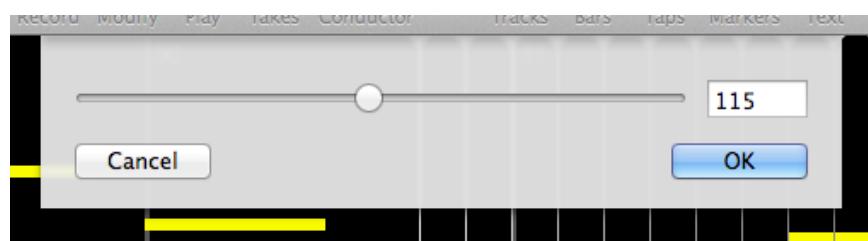
To record a Take, simply place the Tap Pointer at the position where you want to begin recording, and click the Record button in the Toolbar. Recording does not begin immediately; it begins whenever you begin tapping. Recording will stop when you click the Record button a second time.

Using the Click (Metronome)

A *Click* is another name for a *Metronome*, a device used to designate the *Tempo* (speed) of a musical performance. To prepare yourself to perform at the right Tempo, click on the *Click* Toolbar icon and select *Turn Metronome ON*, and select from 1 to 4 measures *Countoff*.



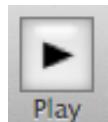
The Tempo value is set by default to the value found in the imported source MIDI file. If you want to set a different tempo, simply choose *Tempo > Set Tempo*, and move the slider to a different value.



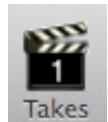
Note that when using the Click/Metronome, you do not need to start recording precisely in time with the click; nor do you need to start performing after the click stops clicking.

Recording still starts whenever you begin tapping, and ends when you click the Record button a second time.

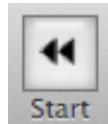
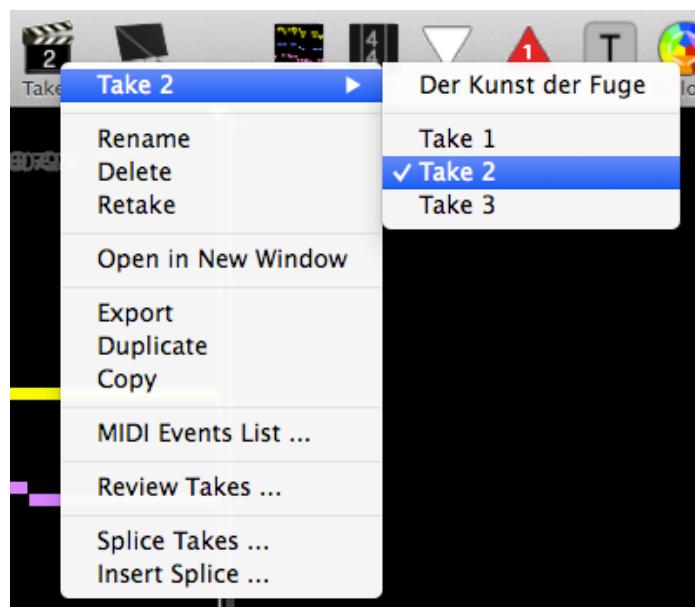
Playing Back a Take



After a Take has been recorded, it is ready for playback. The Takes toolbar icon shows the number of takes which have been recorded. For example, the icon at left below is shown after one take has been recorded.



When multiple takes have been recorded, you can select which take to work with, and the Takes icon will display the number of that Take. Simply click the Takes icon and select the Take you want to work with from the popup menu. For example, if three Takes have been recorded, but you choose Take 2, the icon will display a 2 and not a 3.



When the source file is selected (the Tracks icon displays a star) clicking the Start button moves playback to the beginning of the file. When a Take is selected (the Tracks icon displays a number), clicking the Start button will cue playback to the start of the selected Take.



The Tempo of Take playback can be changed under the Click menu.

During playback, the display shows the music which is currently playing, changing its contents when playback moves forward past what is currently displayed.

Conductor Playback



When recording a Take, two data streams are recorded: one which contains MIDI data, and one which contains tapping actions. This latter data stream is called a *Conductor* track. When you click the Conductor toolbar button, a menu allows you to select any recorded Take for playback using the Conductor track, which taps through the music just as you did.

The usefulness of this may not be immediately obvious. The difference between the recorded Take and the Conductor track of that take is this: the conductor track taps through the MIDI data currently displayed on the screen, it doesn't play back the MIDI data that was recorded. This means that you can edit the data after recording, and tap through it again using the Conductor. You can also record the conducted output as a new take.

The *Conductor* plays recorded Taps, and that output can be recorded as a new Take.

Retaking (Replacing) a Take

Sometimes you may have trouble performing a passage the way you want. In cases where you don't want to use ***Rehearsal Mode*** (see Chapter 10), you can simply *retake* the take. After stopping the failed take, click the **Takes** button in the Toolbar and select **Retake**. Because the action will replace the take, a confirmation window appears, but you can bypass that window by holding the **Command** key when selecting **Retake**. The Tap Pointer will return to the place where the Take began, and the Take will be replaced. Or use the shortcut below:

Quick shortcut: to replace a failed take, simply type “r” (without clicking stop).

Duplicating a Take

After recording a Take, you may want to Modify it (see Chapter 13), edit its MIDI events (see Chapter 14), or perform **Velocity Shaping** (see Chapter 15) – without worrying about having to *undo* your actions. In that case it is a good idea to duplicate the Take before making any modifications or edits. Simply click the Takes button in the Toolbar and select **Duplicate**.

Copying a Take

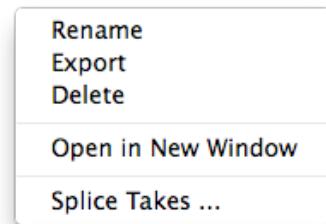
This option is available for cases where you have two or more projects open and you want to Copy/Paste a Take from one project into another. Click the Takes button in the Toolbar and select **Copy**. Then switch to the other project, click on its Takes toolbar button and select **Paste**. Keep in mind that pasting a Take into a project that does not contain the source MIDI file from which the Take was made is possible but will result in odd behaviour, because MIDI Tapper correlates recorded Take data to the data in the imported source file.

Renaming a Take

MIDI Tapper automatically names Takes simply with the word *Take* followed by a number: *Take 1*, *Take 2*, etc. For projects with only a few Takes, this may suffice, but for large projects you may want to give Takes more meaningful names to optimise your workflow. To do this, click the Takes button in the Toolbar and select **Rename**. An input window appears so that you can type in a new name for the Take.

Deleting a Take

To delete a Take, click the Takes button in the Toolbar and select **Delete**. Because the action cannot be undone, a confirmation window appears, which you can bypass by holding the **Command** key when selecting **Delete**.



Opening a Take in a New Window

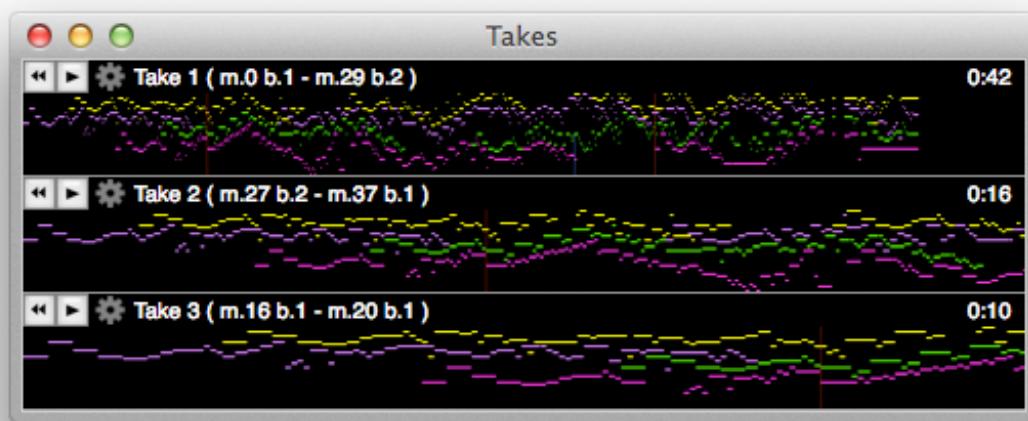
Although MIDI Tapper allows you to edit Take data in the Detail View by selecting notes and choosing **right-click > Current Take ...**, the data displayed in the view is always from the source file and not the Take (see **Chapter 8**), which may in some cases may not be the situation that you are looking for. To see and work with the Take data graphically exactly as you recorded it, the data must be exported as a MIDI file and imported as a source file into in a new MIDI Tapper project. Clicking on the Takes button in the Toolbar and selecting **Open in New Window** does just that, without requiring you to go through the steps of exporting and importing the file.

Exporting a Take

You may export any Take as a Type 1 .mid file for use with any software that supports the .mid format. Click the Takes button in the Toolbar and select **Export**. A dialog appears allowing you to name the file and save it.

Reviewing Takes

It may be useful to listen to and compare takes in graphical overview, length, number of measures spanned, and so on. The **Takes Window** is available for that purpose.



Transport icons in the Takes Window function as expected. Click the Gearwheel icon to open a popup menu with many of the options explained in this chapter and the next.

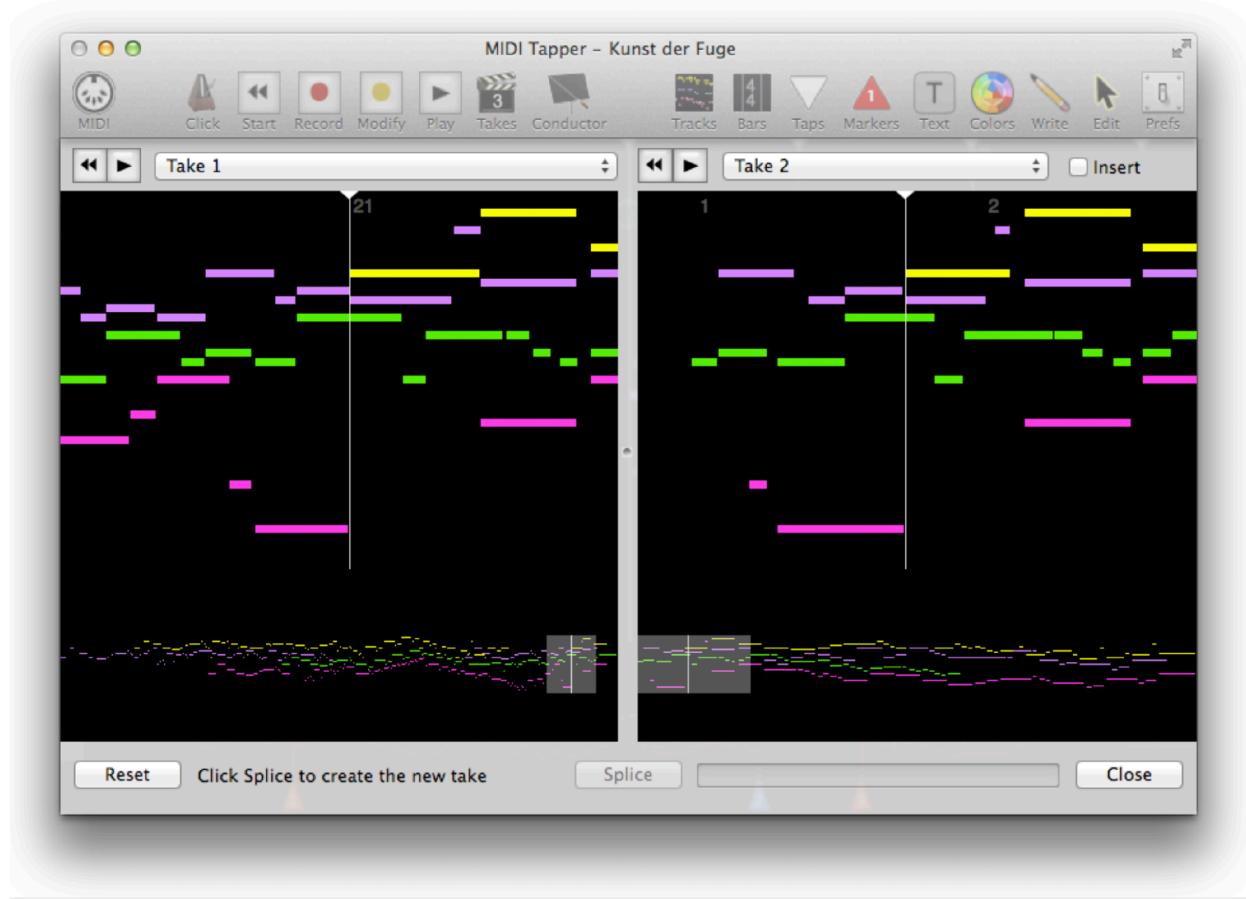
After you have recorded your takes, several post-production methods are available to allow you to tweak your performances, consisting of:

1. *Splicing takes together*
2. *Modifying the articulations of independent voices*
3. *Reshaping overall velocities to naturally control dynamics*
4. *Editing MIDI data directly using a MIDI Events List*

These topics are covered in the next four chapters.

12. Splicing Takes Together

Although a musical performance recorded in a single Take may represent an ideal, since the invention of magnetic tape it has been normal practice to combine several Takes together to eliminate flaws or capture more inspired moments. A *Splice* refers to the joining together of two Takes, and the process of putting Takes together is called *Splicing*. MIDI Tapper lets you splice Takes together in two ways: the *Simple Splice*, and the *Insert Splice*, as explained below.



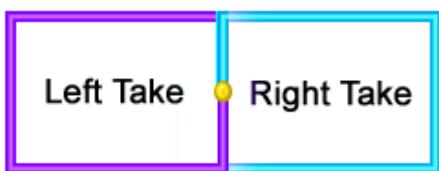
The Splicing Process

The process of splicing involves first imagining a resulting flow of music in terms of one Take moving into another. In the Splice Window, this flow is organised from left to right, and instructions are given at the bottom of the window at each step of the process. You choose a Left Take, and a Right Take, to splice together with a *Simple Splice* or *Insert Splice*. Each side includes an Overview and Viewport for navigation, and transport buttons to preview each Take. A note must be chosen in each Take, marking a splice point. These notes become outlined and are marked with “*CUT*”, and “*Continue ...*” according to the direction of flow. For a Simple Splice, there is one note to select in both Left and Right Takes. For an Insert Splice, there are two notes to choose, as the Left Take begins flow, the Right Take picks up the flow, and hands the flow back to the Left. After these notes have been chosen, the Splice

is made, and a preview of the result is given, to be approved or rejected. If rejected, the process is cancelled and the window returns to its initial state. If approved, a name is given to the result, and the Takes used to make the result can be deleted at that point if desired.

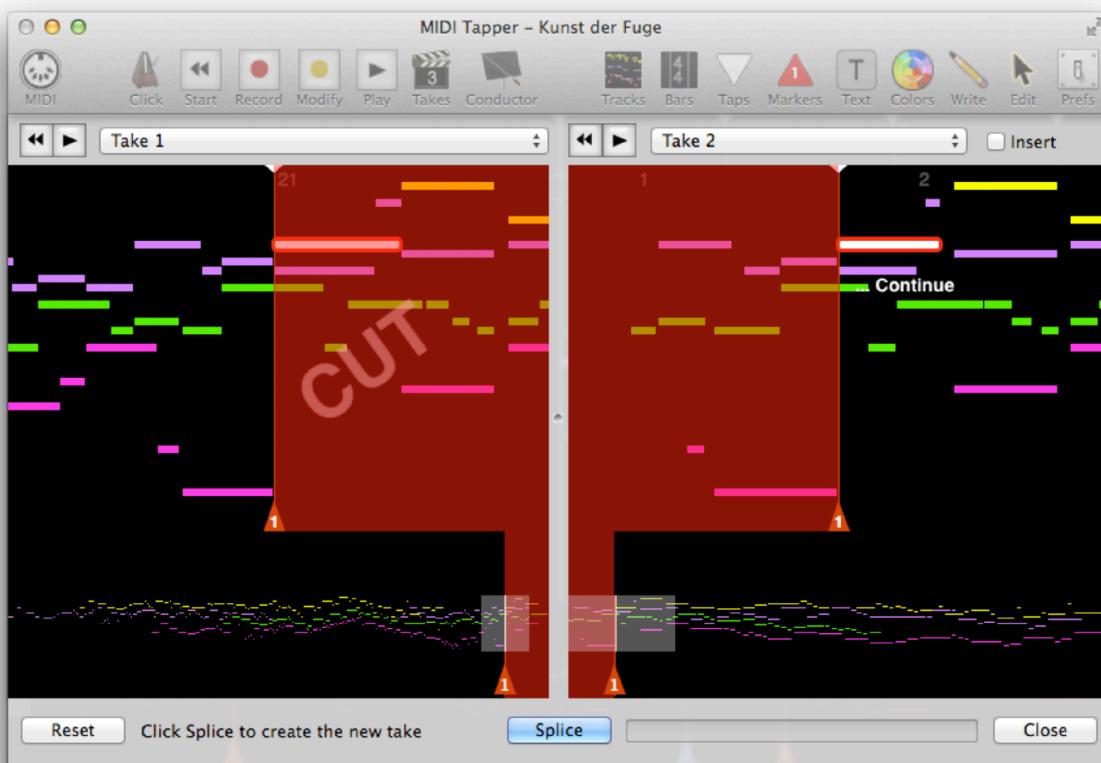
Simple Splice

A simple splice consists of two Takes joined together at a single Splice Point. The Left Take is spliced to the Right Take as in the diagram below. *Example:*



- **Left Take:** starts at the beginning and is flawless up to a point where a mistake is made.
- **Right Take:** has been recorded starting just prior to the mistake, continuing without error to the end.

For a Simple Splice, one note is selected on both Takes: a note in the Left Take where the Splice is to occur, marked “**CUT**”, and a note in the Right Take where it is to be spliced into the first, marked “**Continue ...**”. The same note must exist in both takes, and must be first selected on the left, then on the right. When you select the note on the left, MIDI Tapper will try to find the corresponding note on the right for you, but you may have to find it yourself.



Insert Splice

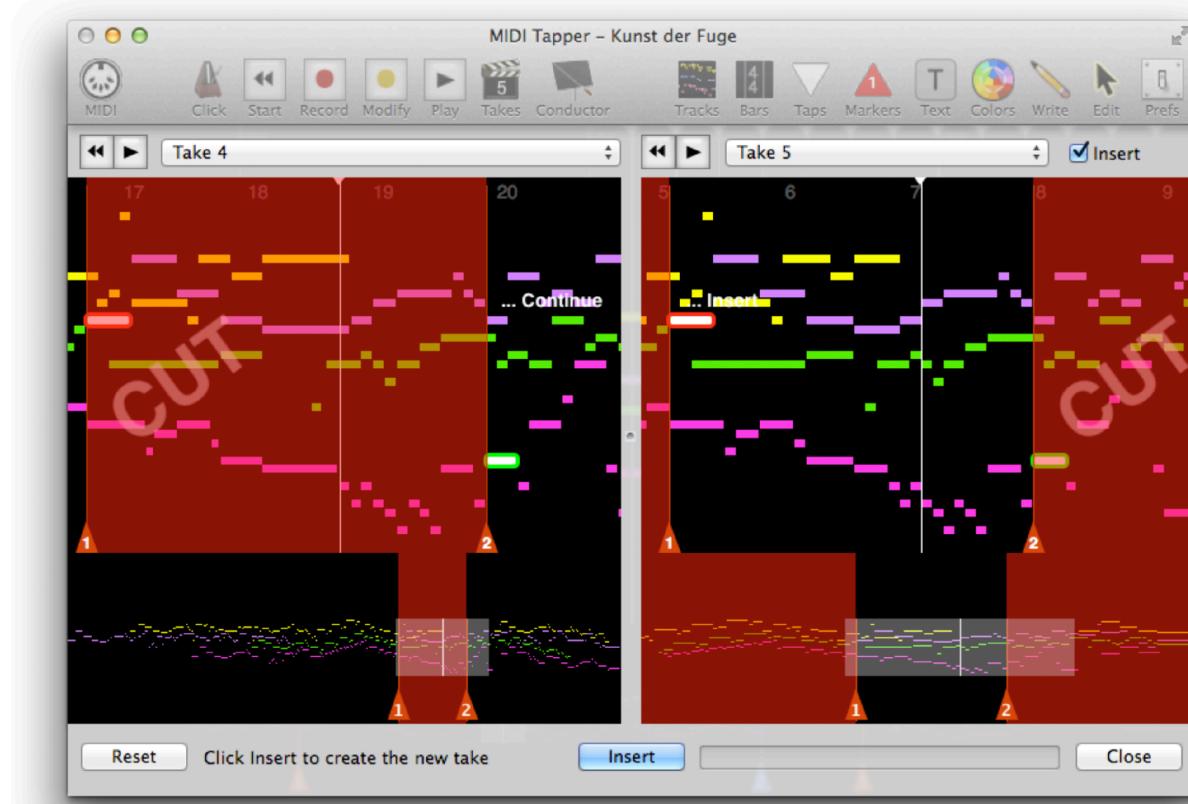
When a portion of one Take is inserted into another Take, it is called an Insert Splice. The Right Take is inserted into the Left Take as shown in the diagram below.



Example:

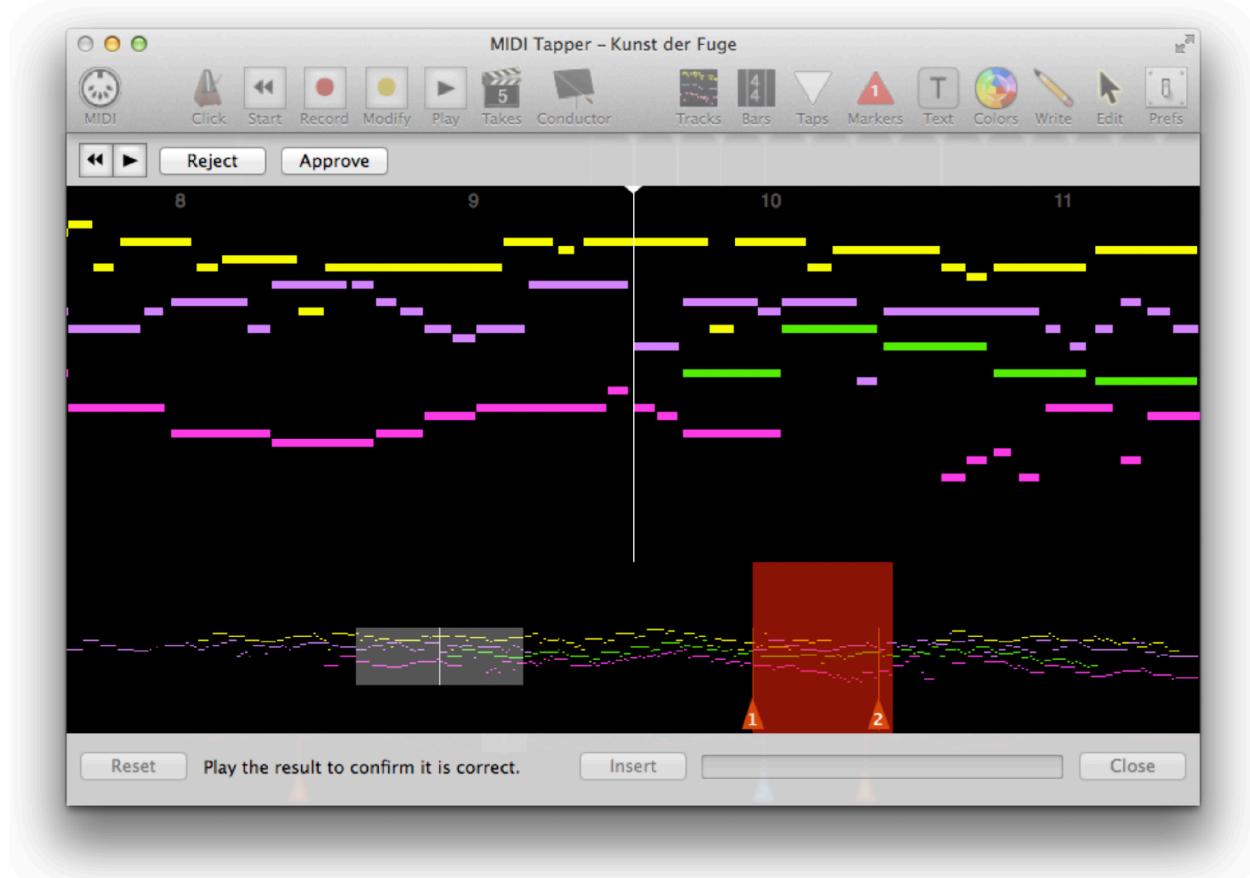
- **Left Take:** is the way you want it, except for a mistake in one spot.
- **Right Take:** is an error-free recording beginning shortly before and ending shortly after the mistake in the Left Take.

Insert For an Insert Splice, check the Insert option. Two notes must then be selected in both Takes: a note in the Left Take where the Splice is to occur, marked “**CUT**”, a note in the Right Take where it is to be spliced into the first, marked “**Continue ...**”, a second note in the Right Take where the inserted passage is to end, also marked “**CUT**”, and a second note in the Left Take where the insertion ends and the left Take picks up again, marked “**Continue ...**”. Each time you click on a note, MIDI Tapper tries to find the corresponding note in the opposite view for you, but you may have to find notes yourself.



Approving / Rejecting a Splice

After clicking the *Splice* or *Insert* button, the result is presented for approval or rejection. The Tap Pointer is placed shortly before the splice point, and a transport allows you to play back the result.

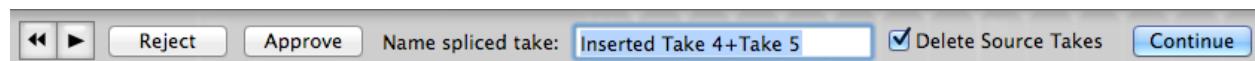


Reject

If the *Reject* button is clicked, the process is cancelled and the Splice Window returns to its initial state.

Approve

If the *Approve* button is clicked, a textfield appears to name the resulting spliced Take, with an option to delete the source Takes. By default, the name of the spliced take consists of the names of the Takes involved in left-right order. If the Splice is of the Insert variety, the name begins with the word “Inserted”.



Clicking the *Continue* button finalises the process and returns to the initial state of the Splice window, including the newly spliced take in the Take selection popup menus.

13. Modifying Articulations

MIDI Tapper allows you to modify the articulation of any notes in a recorded Take in two ways: by selecting notes and changing their durations by percentages, or by selecting notes and tapping through them independently to achieve a more natural sounding result.

The Articulations Menu

Tapped notes can be selected and their durations can be changed to one of six available percentages, ranging from **Light Detached** (95%) to **Staccatissimo** (25%). To open the menu, **right-click** and select **Current Take > Articulation ...**

Light Detached (95%)
Detached (90%)
Accented Detached (80%)
Mezzo Staccato (75%)
Staccato (50%)
Staccatissimo (25%)

Quick Shortcuts: Select notes and type “d” to change articulation to **Detached** (90%) or type “c” to make the articulation **Staccato** (50%). These options can be turned off in the **Preferences Window**.

Tapping vs. Multi-Pass Recording

In multi-pass recording, each part is recorded individually, and the resulting combination of passes is then possibly quantised, often using a humanisation algorithm to keep the result from sounding too mechanical. MIDI Tapper’s Tap Group paradigm obviates the need for multi-pass recording, and humanisation algorithms are not needed because the performance is already human. A single tapped performance is thus coherent and authentic in a way that multi-pass recordings cannot be, because a single intention is captured in real time instead of many, with the timing of all events controlled by a single performance with no quantisation or algorithmic manipulation. As a recording concept, tapping thus comes much closer to the ideal of conventional performance than multi-pass recording.

Why Modify Notes?

An important consequence of the Tapping paradigm is that notes are articulated together in Groups, and this fact represents a possible downside when compared with multi-pass recording. In cases where the music is relatively homophonic, tapping can produce a natural-sounding result without further modification, but in cases such as polyphonic music where voices would normally be articulated independently, a tapped performance can sound a bit unnatural. Musicians articulate notes in any number of ways throughout a performance, and the expressive ways in which notes are articulated form an integral part of an overall performance. Modifying a Take with individual articulations is thus a musically important way to improve the expressiveness of a tapped performance.

What Is Modified?

In terms of note parameters recorded by MIDI Tapper, articulation primarily involves note *Velocity* and note *Duration*. MIDI Tapper thus allows modification of Velocity and Duration of any selected notes in a recorded Take. This is done without changing the recorded Note ON times, so that the articulation can be performed naturally without having to worry about synchronising the rhythm (the Note ON times) exactly with what has been recorded. In other words, when modifying note Durations, one needs to be rhythmically precise with note releases, but note attacks do not need to be in strict time, because they are already given in the recorded Take. Although articulation can also be said to involve note onset (MIDI Note ON) timing, that aspect of performance is better considered part of the Tapping paradigm. Nevertheless, Note ON times may also be modified after a Take has been recorded.

Selecting Notes for Modification

Keep in mind that you must only select notes that actually exist in the Take being modified, or modification will not work.

Velocity & Duration Options



Once the notes are selected, click the *Modify* toolbar button and select the option listing the parameters you want to modify if it is not already selected.

Because you will usually want to modify note *Velocities & Durations*, that option defaults as selected.

Modify Selected Notes
✓ Velocities & Durations
Velocities Only
Durations Only
+ Note ON Times
Note ON Times Only

Note ON Time Options

Because modifying *Note ON Times* is less likely to be needed, that option is separated and pushed to the bottom of the menu. Selecting *+ Note ON Times* means whatever combination of Velocities and Durations you have selected will be combined with the Note ON Times option. Selecting *Note ON Times Only* means Velocity and Duration will not be modified. Keep in mind that modifying Note ON Times requires you to match your performance tempo and rhythm to the recorded Take exactly or the result will sound wrong. Therefore it should be used with caution. A reasonable guideline is as follows:

Use the *Note ON Times* modification options sparingly, and limit your selections involving these options to a few notes at a time.

Modifying Selected Notes



After selecting the notes to modify and choosing the modification options you want, click the Modify toolbar button and choose *Modify Selected Notes* from the menu.

The Modify button will appear illuminated, and the Tap Pointer will move to the first note in your selection. Tap through the notes with the articulations as you want them. When you reach the end of the selection, the process ends automatically and the Modify button returns to its off state. The Tap Pointer also moves to a position slightly before the modified notes, so that you can click Play to preview the result. If you are not happy with your modification, you can *Undo* the action.

Modifying and Workflow

In order to understand how Modify functions can be useful for your work, it may be helpful to keep in mind the following general workflow model of four stages (compare with the Introductory workflow list given on pages 10 and 11):

1. Import the MIDI file and prepare it for tapping by Grouping and Ungrouping Taps as needed, adding Markers and Texts, assigning Rubatos, adding Ornaments*, and so on.
2. Tap through the piece as a whole, recording one or more Takes. Often arriving at your goal will require splicing several Takes together. The result should be a Final Take which is free of errors.
3. Shape the details of your expression by Modifying articulations the Final Take to musically clarify various voices as would be done in a conventional performance.
4. Overdub Continuous Controllers (CCs), Reshape Velocities and edit MIDI Events in the Final Modified Take to tailor the MIDI output for final rendering.

* Adding ornaments is a function available in *Write Mode*, explained in Chapter 8.

The next three Chapters explain the last stage listed above.

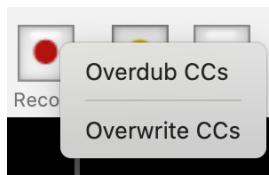
14. Overdubbing CCs



By design, MIDI Continuous Controller (CC) messages are not part of the tap stream. This is so, because CC events can happen at any moment, not just when notes are played. For example, when you use the sustain pedal during tapping, the events are recorded at the moments you depress and release the sustain pedal, and the timings of these events don't necessarily correspond with tap times. Although you can edit (change timing, add or remove) these events in the Events List (see [Chapter 16](#)), in most cases you will want to add new CC events in real time, as in a real performance. After you have recorded a take, you can do this using the **Overdub** function.

Overdubbing – what it is & how to do it

To overdub means to add to an existing recording in real time. In MIDI Tapper, only MIDI CC messages can be overdubbed (not notes). The **Record** button is used with the **Shift** key to begin overdubbing CCs at any point in the piece. Place the tap pointer where you want to start overdubbing, hold down the **Shift** key and click on the **Record** button. A menu will appear with two options:



The option **Overdub CCs** lets you add CCs to the existing performance without altering any CCs originally recorded in the take.

The option **Overwrite CCs** allows you to replace any existing CCs in the take with what is overdubbed. You can use this to **erase** existing CCs by overwriting nothing.

Once started, overdubbing or overwriting CCs continues until you click the record button or the play button (or tap the spacebar).

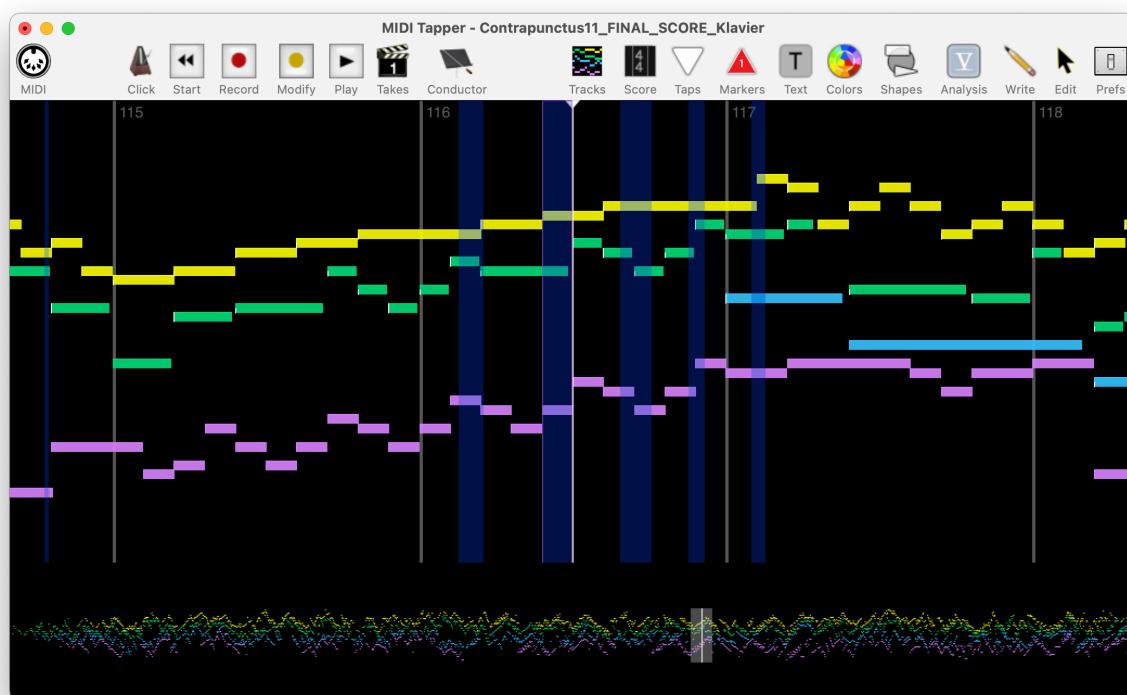
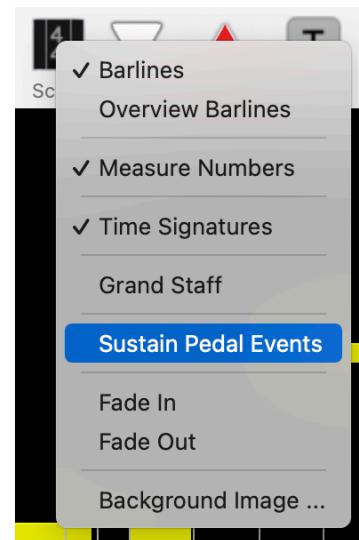
Be careful when Overdubbing pedal CCs to a passage within a take where such pedal messages already exist during the portion you are overdubbing, because you can end up with pedal ON/OFF sequences which no longer make sense. If that should happen, MIDI Tapper tries to find the wrongly sequenced events and correct them, but the way the software corrects an error may not give the performance result you intended.

When overdubbing, be careful with the order of pedal ON and OFF events.

Viewing CCs in the Detail View

Because the Detail View is showing the source data and not recorded data, displaying CCs recorded in a take runs somewhat counter to the design. It is however possible by placing the events at positions *scaled* relative to the source data.

Displaying various kinds of recorded CCs is still under development. Currently, only Sustain Pedal CCs can be displayed. Turn this option on by clicking the Score toolbar item and selecting *Sustain Pedal Events* from the popup menu. Sustain events will appear as transparent blue bars within the source data. Future versions of the software will allow direct editing of these events by dragging positions, but presently the display is simply for visual feedback, and editing of the events must take place in the MIDI Events List (see [Chapter 16](#)).

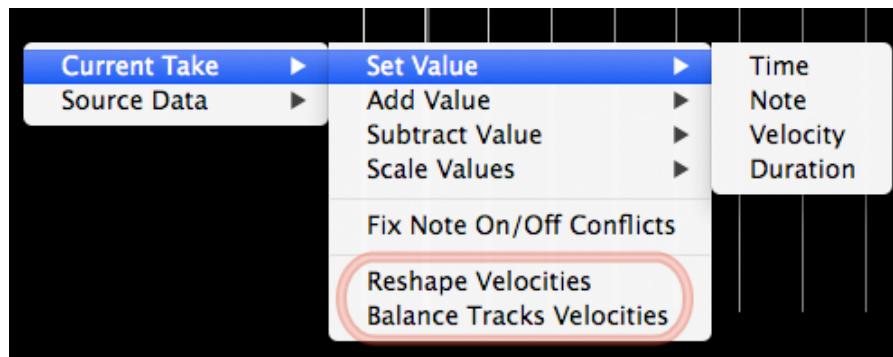


15. Velocity Shaping

MIDI Tapper can analyse all the velocity values (dynamics) performed in a selection per track, so that you can see the relative dynamics of passages – how loud or soft you are playing in terms of MIDI velocities. You can then shape the high, low, and peak values per track or as an average of all tracks, in order to sharpen the dynamic consistency of your performances.

Editing vs. Reshaping Velocities

There are many ways to edit recorded Take velocity values, as discussed in **Chapter 8**. For example, after selecting notes, try **right-click > Current Take > Set Value, Add Value, Subtract Value, or Scale Values**. All of these functions can be applied to a range of MIDI parameters (note, duration, Note ON time, velocity). This chapter deals with a special kind of editing devoted to Velocity data, called **Reshaping**. Two options shown at the bottom of the **right-click** menu, **Reshape Velocities** and **Balance Tracks Velocities**, are discussed below.



Why Shape Velocities?

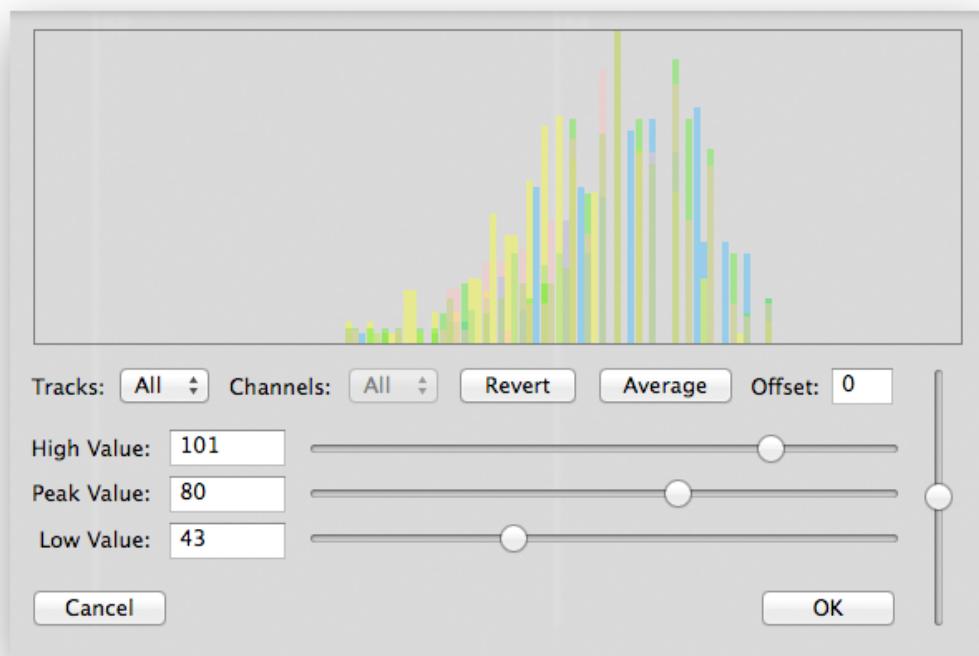
Musicians practice music with aims for general dynamic levels, but when the moment comes to perform the music for a recording under pressure, the music can be performed dynamically differently than prepared. While sometimes that can be okay, usually it means that the recording does not sound as intended. Sometimes it also takes more than a single session to record a piece, by splicing multiple Takes together, and from one session to the next performance dynamics can change, so that splicing Takes together results in noticeable shifts in dynamic levels. Whereas in conventional performance it is impossible to change the performance dynamics of the music after it has been recorded, MIDI Tapper allows you to do just that. Changing velocity values relatively, increasing or decreasing them at once or over time, is useful for improving small sections of music, but it also requires a lot of disjointed work, raising values or lowering them, in curves or lines. Velocity Shaping is an option which works on the data holistically, allowing you to reshape your recordings while preserving the underlying integrity of your performance. Reshaping is intended to save you time and trouble involved with conventional piecemeal editing techniques, so that you end up with a more natural, coherent result.

Selecting Notes for Velocity Shaping

Shaping velocities begins by selecting notes. The different ways to select notes are outlined in **Chapter 7**. Because the shaping of dynamics tends to be a composition-wide or section-oriented musical parameter, using *Select All* or adding **Markers** and using the *Select Within Markers* options are helpful. For example, if you have spliced together two Takes, and upon previewing the result you realise that the second Take has been performed at a slightly different dynamic level than the first, you can add a marker at the splice point, and then use *Select Within Markers* to select the spliced portion from the second Take in order to reshape velocities to better match the first Take.

The Velocity Shaping Window

After selecting notes and choosing **Reshape Velocities** (**Quick shortcut:** Shift-r), a window opens showing a chart of all the velocity values in the selection, grouped and color-coded by Track. The chart is a *histogram*, which is just a fancy word for a bar graph, showing all MIDI values from 0 to 127 on the x axis. Normally, the data will vaguely resemble a bell curve.



Tracks: All The **Tracks** menu allows you to select All (default), or individual Tracks.

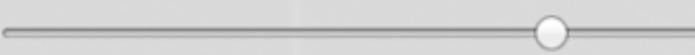
Average Initially, raw data is displayed and no numbers are visible in the fields marked **High**, **Peak**, and **Low Value**. Click the **Average** button to see values and enable the sliders. Note that averaging the values will change velocities.

Revert Click **Revert** if you want to see the raw values again.

The vertical slider on the right controls the *Offset* value. When you move this slider, all three values – **High**, **Peak**, and **Low** – are moved together as a unit, up or down. The relationships between the values remain the same. You might think of this as a sort of master volume fader for all of the dynamics in the selection.



High Value:



Adjusting the **High** value moves the highest value in the chart higher or lower (right or left). As you adjust this value, you will notice that the values in between the Peak and the High value will be adjusted proportionally. The result of this will be an overall increase or decrease in the velocity values and range of the loudest dynamics in the selection.

Peak Value:



Adjusting the **Peak** value alters the highpoint of the curve. The result of this will be an overall increase or decrease of the majority dynamic level in the selection.

Low Value:



Adjusting the **Low** value moves the lowest value in the chart higher or lower (right or left). As you adjust this value, you will notice that the values in between the Peak and the Low value will be adjusted proportionally. The result of this will be an overall increase or decrease in the velocity values and range of the lowest dynamics in the selection.

After you have moved all the sliders where you want them, click **OK** and the velocities will be reshaped. If you are not happy with the result, you can *Undo* the operation.

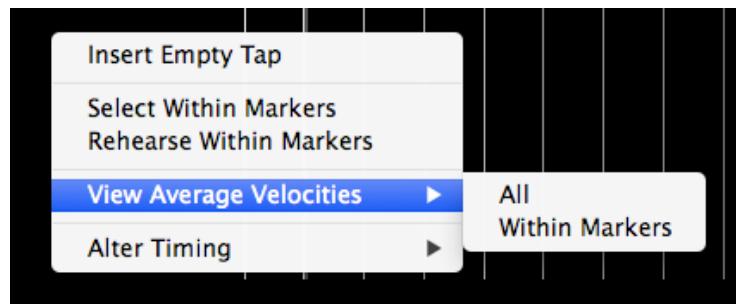
Balance Tracks Velocities

Sometimes after recording Tracks, Splicing them together, Modifying articulations, and so on, the relative velocities of various voices can become unbalanced. Or there may just be a passage in which one voice is louder than the rest, or softer than the rest, and you want to somehow get a less stratified result without having to directly edit the voice that is at an unwanted dynamic level. The menu item **right-click > Balance Tracks Velocities** is available for these situations. MIDI Tapper will analyse the total velocity content of the selection, and alter the relative velocities of the voices to produce a smoother result. If you are not satisfied with the result, you can *Undo* the operation.

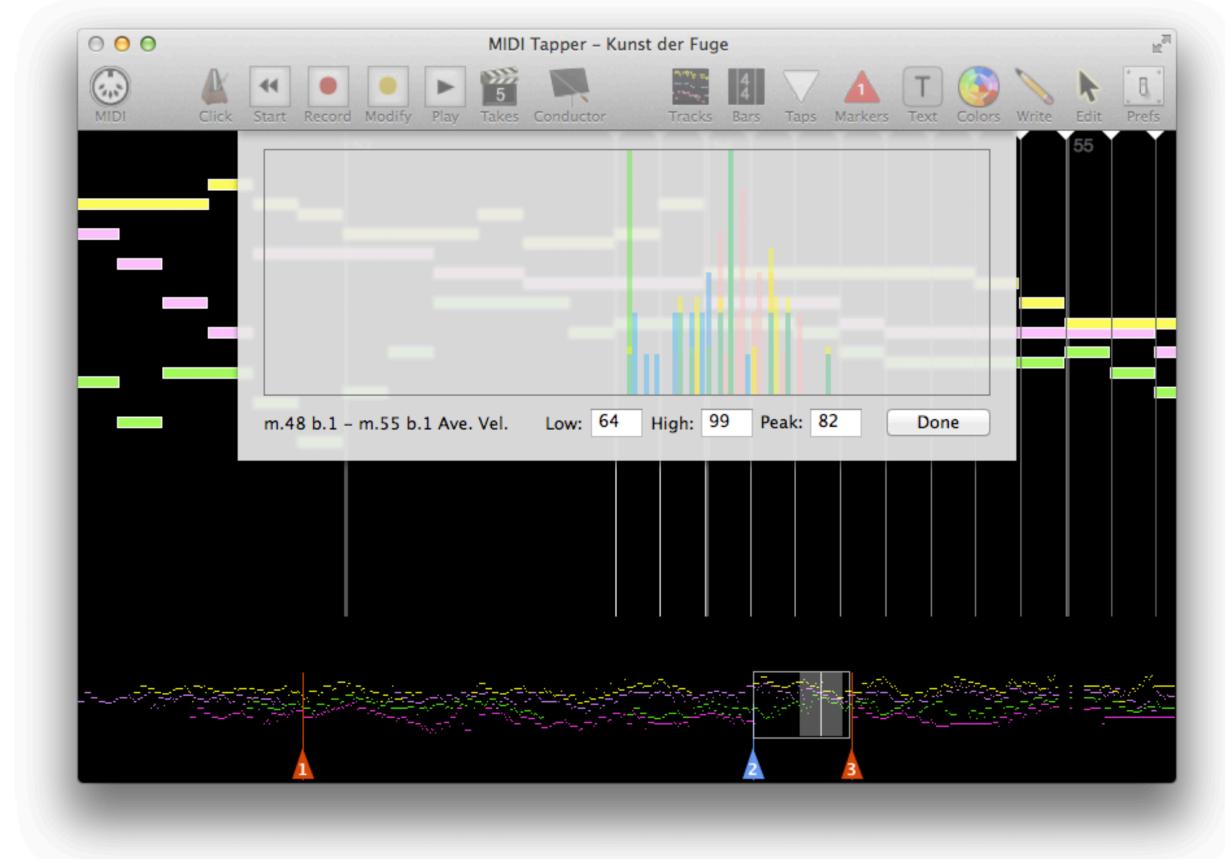
Viewing Average Velocities

When working with the Velocity Shaping Window, you may sometimes want to have in mind data values from other sections of the piece, or from the piece as a whole. Or you may want

to know those values as you are editing MIDI data in other various ways. Two *right-click menu* options are available under *View Average Velocities* for that purpose.



When you select *All* or *Within Markers*, a simplified version of the velocity shaping window appears, showing the length of the section in measure numbers, and the Low, High, and Peak values within the selection. A white box is also drawn in the overview to show the portion of the piece analysed. The simplified window does not allow you to edit the values; its purpose is only to inform. Once you have understood the data, click *Done* to close the window.



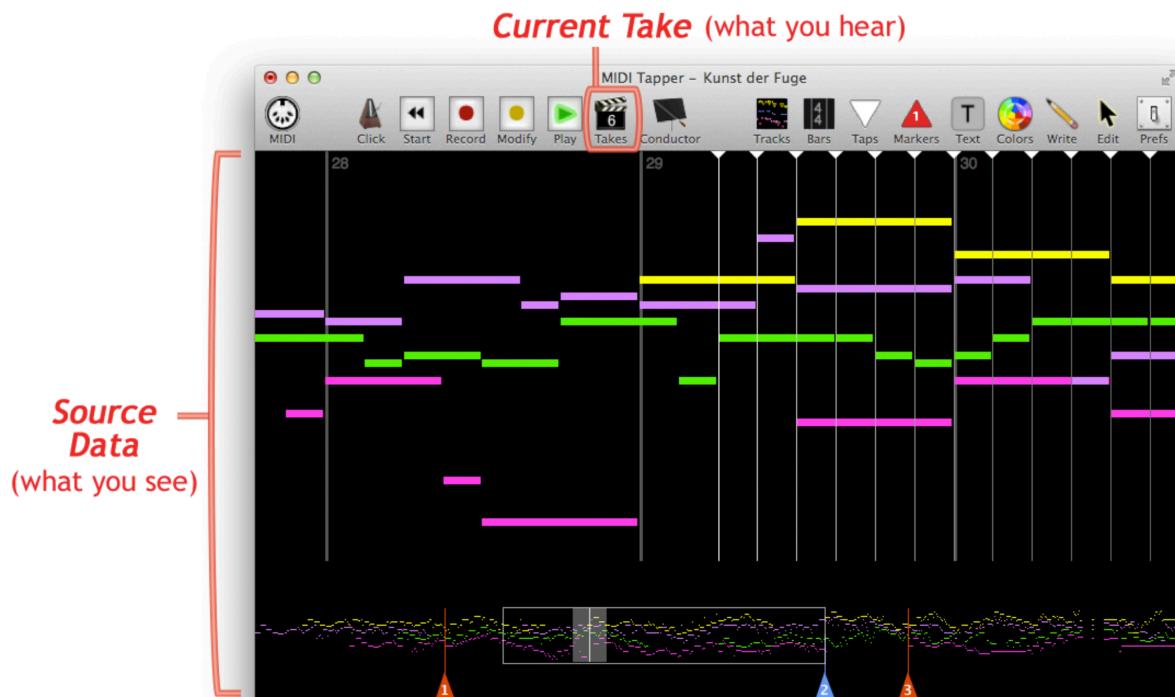
The next chapter discusses other ways to edit velocities and other MIDI data.

16. Editing MIDI Events

MIDI Tapper allows MIDI data to be edited in both conventional and novel ways. This chapter explains how MIDI data is handled by MIDI Tapper, and introduces you to the methods and functions available for MIDI data editing.

Source Data vs. Current Take data

Source Data refers to the imported MIDI file data, and *Current Take* data refers to recorded performance data: specifically, the Take currently selected in the toolbar. It is essential to be aware of the difference between these two sets of data when editing MIDI data in MIDI Tapper. The *Source Data* is always that data which is displayed graphically in the Overview and Detail View. It may help to think of this as the musical score, as graphical musical notation, from which your performances are derived. The performance timings, durations, articulations, and so forth in the Current Take data are *not shown* in the graphical display (because they are not part of the Source Data). When a Take is selected for playback in the toolbar, what you see is still the Source Data, what you hear is the Current Take data.



Linked Takes

Source Data and Current Take data are different and separate data sets, but when you select a note in a recorded Take, that note can be located in the Source Data, and vice versa. This is done using Track and Note *Indexing*. Each note in the Source Data has a Track index, and a Note index within each Track. For example, the first note in Track 1 has a Track index of 1 and

a Note index of 0. Through this system of indexes, each Take is said to be *Linked* to its Source Data. By definition every Take thus begins its life as a *Linked Take*.

Post-Take Source Data Editing

If Source Data is edited after a recording has been made, MIDI Tapper attempts to update all Linked Takes with the changes made to the Source Data. For example, if the vertical position (Pitch, MIDI note number) of a note is changed in the Source Data, that note will be found and updated in all Linked Takes. This kind of editing should be done carefully, because some actions could possibly result in broken Links, such that the notes in the Linked Takes can no longer be found in the Source Data, and vice versa. For lack of a better term, such a Take is called a *Broken-Link Take*. The practical consequences of a Broken-Link Take should be considered before you decide to Post-Take edit your Source Data. For a Broken-Link Take:

1. MIDI playback will function normally, but the display will not update properly during playback.
2. Display of Track and Note Indexes in a MIDI Events List will show incorrect information in the *Track* and *Note* columns.
3. Selecting Notes in a MIDI Events List will not select the correct notes in the Detail View.
4. Editing MIDI data using a MIDI Events List will be incorrect and unpredictable.

MIDI Tapper updates Linked Takes with edits made to Source Data, but one must take great care when doing this kind of editing, as it can result in Broken-Link Takes.

Current Take Editing

Although some caution must be taken when editing Source Data Post-Take, as a normal post-production stage of MIDI recording – your opportunity to perfect the MIDI output of your performance, editing the MIDI data of a recorded Take presents no risks. MIDI Tapper provides two editing workflow methods: *Detail View right-click*, and opening a *MIDI Events List*.

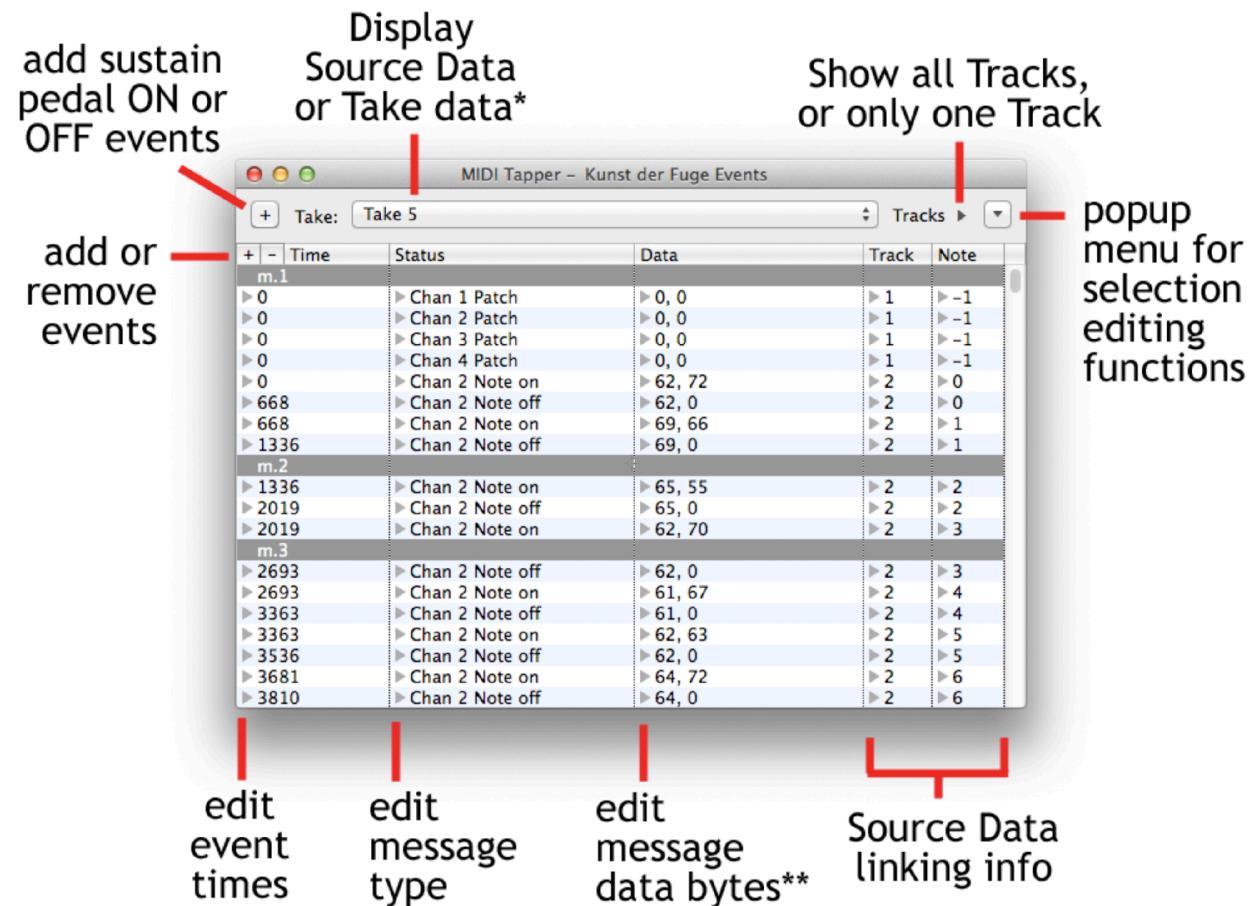
Detail View Right-Click

Working in the Detail View with *right-click* popup menu items is the most direct way to edit MIDI data in MIDI Tapper. The menu items are created dynamically according to the Current Take, and whether notes are selected or not. When no notes are selected, the popup menu contains fewer options. With notes selected, the menu shows many more options, some of which are included only when relevant to the properties of the selected notes. The possible

menu options are discussed below under individual option headings starting with *Popup Menu Editing Options*.

MIDI Events List

In contrast to the Detail View, which always shows the *Source Data*, the *MIDI Events List* can show recorded MIDI events for any Take (including the Source Data). Additionally, when showing the data belonging to a recorded Take, all messages can be edited in all parameters: *Time*, *Status*, *Data*, as well as *Track* and *Note* linking info (see above).



* Note that when *Source Data* is shown, the data is not editable in the *MIDI Events List*.

** Editing event data bytes should only be done if you understand MIDI messages

 The leftmost button at the top of the *MIDI Events List* Window allows insertion of MIDI Sustain Pedal ON / OFF events. This is a convenience for dealing with these messages specifically, because they are so important for piano music (for which *MIDI Tapper* is optimised). In situations where you have no sustain pedal and are unable to record sustain events as part of your tapped performance, this button allows you to add those messages manually.



The button on the top right provides access to all of the common editing *Popup Menu Editing Options* which are also available through *right-click* in the Detail View.

Adding or Removing MIDI Events

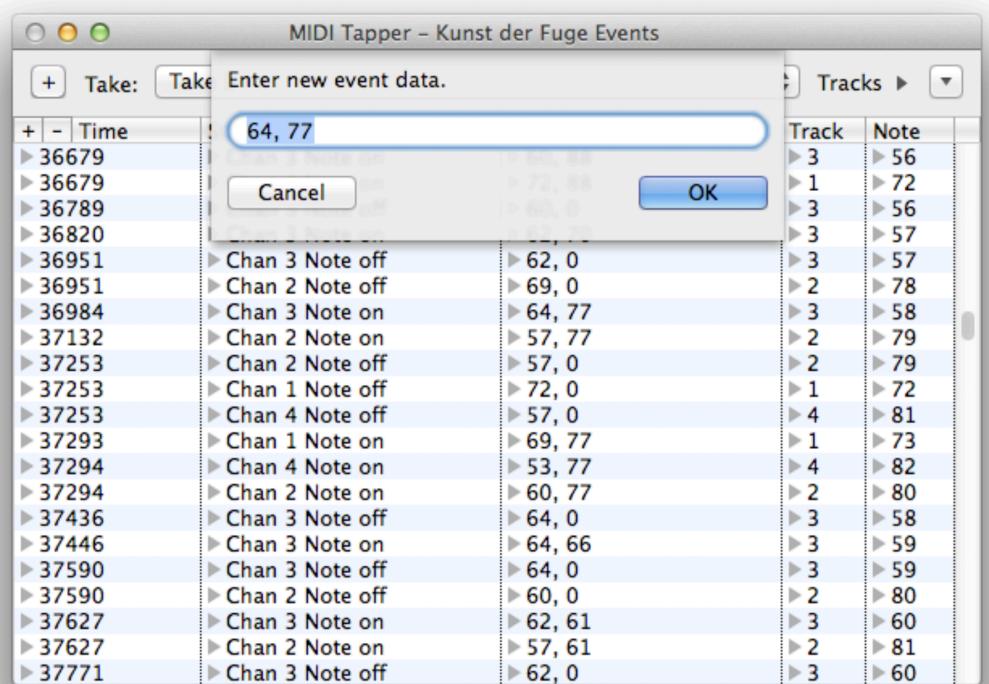
These buttons give you a convenient way to add or remove MIDI CC events. You may change the type of MIDI Event to anything you want, but keep in mind that it can be risky to add or remove note-related MIDI events from the MIDI Events List, because of data *Linking*, as described above.

Absolute Event Times

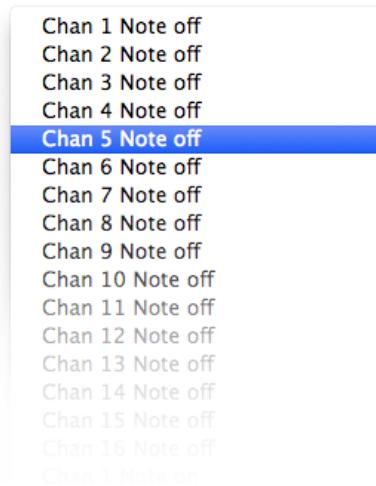
Although MIDI files operate with *delta times*, the leftmost column of the list shows the *absolute* times of all MIDI events, in *milliseconds*. This approach allows you to see relationships between events as you scroll through the list, whereas showing delta times would provide no such information.

Editing Listed Values

► The *Time*, *Data*, *Track*, and *Note* columns are all edited in the same way, by clicking the grey triangle and typing in a value or values into a subsequently appearing dialog entry field. Editing a Data value is shown below. Note that the value is a comma-separated list.

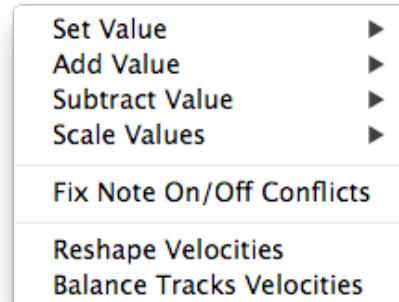


Editing a MIDI event Status does not open a dialog, but instead opens a popup menu listing all the available MIDI Status messages.



Popup Menu Editing Options

The editing options which are common to both the Detail View **right-click** and the **MIDI Events List** are contained in a popup menu which also includes the **Velocity Shaping** options discussed in the previous chapter and one other general option discussed below. In general, the editing functions deal with MIDI values, allowing you to **Set**, **Add**, **Subtract**, or **Scale** those values.



Parameter Values

For each function, a submenu is available to allow selection of **Time**, **Note**, **Velocity**, or **Duration**. It is helpful to keep in mind the following properties of each parameter.

Parameter	Determines	Range	Units
Time	<i>event time</i>	0 - ?	<i>milliseconds</i>
Note	<i>pitch-height</i>	0 - 127	<i>MIDI</i>
Velocity	<i>note loudness</i>	0 - 127	<i>MIDI</i>
Duration	<i>note length</i>	1 - ?	<i>milliseconds</i>

Fix Note On/Off Conflicts

Repeated notes in a MIDI data stream can sometimes result in a problem which is easy to hear but difficult to see, or which is easy to grasp mentally but difficult to describe or show graphically. It happens when two of the same notes in the same voice are overlapping, and the Note OFF event from the first note comes after the Note ON event of the second note. The result is that the second note gets “choked” so that it doesn’t sound, or only sounds for a few milliseconds. In MIDI Tapper, this situation is called a **Note On/Off Conflict**, and this menu item exists to fix the problem. In general, you should not need to use this function very often.

Set, Add, or Subtract Value

For all notes in a selection, a fixed value can be set for the **Time**, **Note**, **Velocity**, or **Duration**. A fixed amount can also be added or subtracted from any one of those parameters.

Scale Values > Flat

The **Scale Values > Flat** option is useful for situations where it is useful to think about changing values in terms of a percentage. Under this option, the Note parameter is not listed. For example, it may be easier to imagine the velocities of all the notes in a passage at 120% of their current value rather than adding or subtracting some fixed amount to existing values.

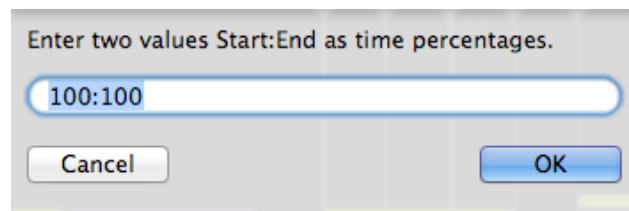
When working with Time, it is important to remember that more or less than 100% means more or less Time, so a larger percentage is not faster; it is *more time*, so it is *slower*. MIDI Tapper handles the shifting of surrounding events for you. For example, if you chose to change the **Time** parameter of a selection to 200%, then all the events in the passage will happen *twice as slowly*.

Time: < 100%	Time: 100%	Time: > 100%
<i>less Time</i>	<i>current Time</i>	<i>more Time</i>
<i>faster</i>	<i>current speed</i>	<i>slower</i>

Usually you will want to edit the timing of Note ON and Note OFF events together, but there may be cases where you want to deal with ON and OFF events separately. Keep in mind that it is only possible to do that in the **MIDI Events List**.

Scale Values > Linear

The **Scale Values > Linear** option is a percentage model for changing values over time. Two values are input into the entry field separated by a colon.



Effectively this tool allows the manufacture of conventional tempo changes (*accelerando* and *ritardando*) and dynamic changes (*crescendo* and *diminuendo*). It is important to remember how MIDI Tapper handles the Time parameter, as it is easy to accidentally reverse the logic when inputting your values.

Scale Values > Linear >	function	musical term
<i>Time ... 100% : lower value</i>	<i>speed up</i>	<i>accelerando</i>
<i>Time ... 100% : higher value</i>	<i>slow down</i>	<i>ritardando</i>
<i>Velocity ... 100% : higher value</i>	<i>get louder</i>	<i>crescendo</i>
<i>Velocity ... 100% : lower value</i>	<i>get softer</i>	<i>diminuendo</i>

Under the **Scale Values > Duration** menu, there is no Linear option, because it does not correspond to a normal musical function.

Quick shortcut: make a selection and type “t” to open the dialog for scaling time.

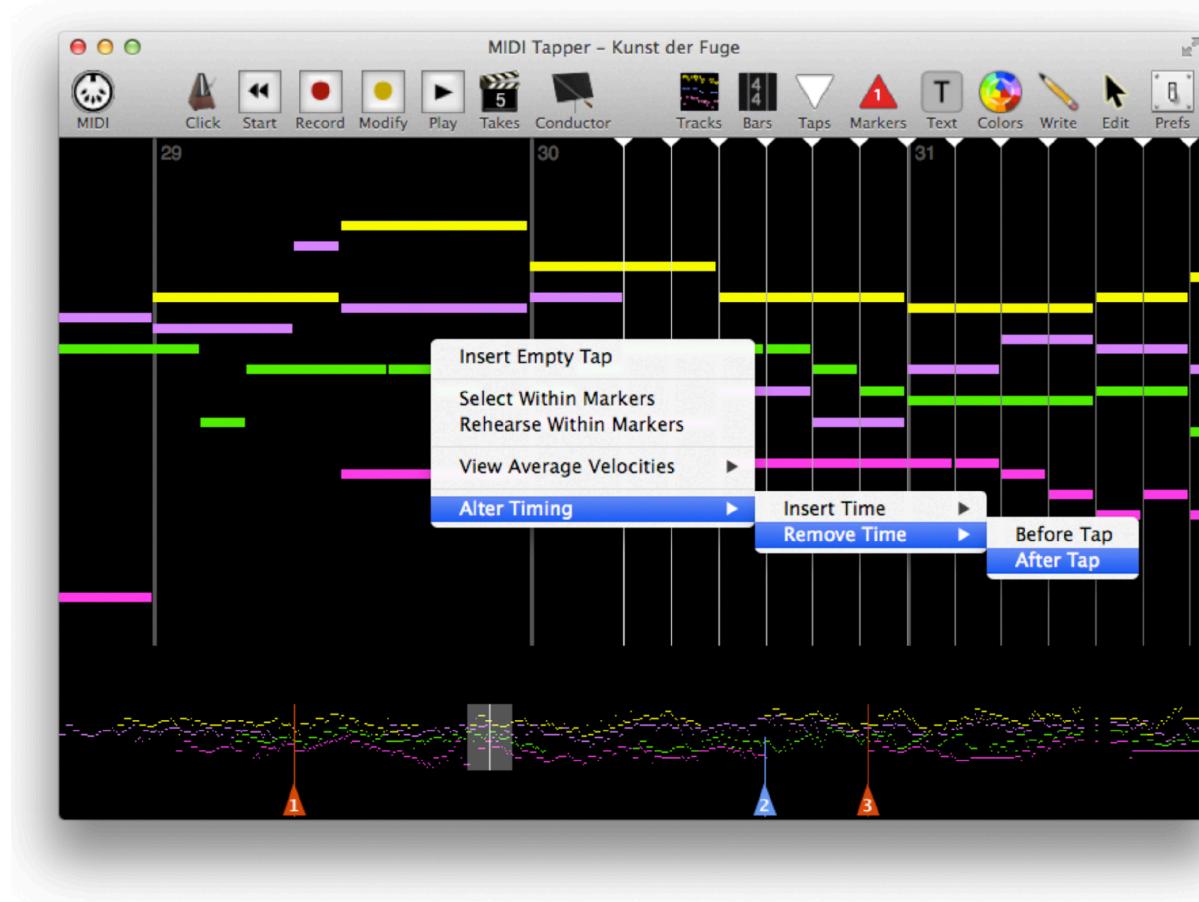
Scale Values > Velocity > Slider

An additional option is provided for scaling Velocity values using a slider. When you select this option, a slider appears on screen in the Detail View, which looks and behaves the same as the slider that appears when you select **Edit Note Params > Velocity**. All values are proportionally scaled by the MIDI value shown, which is the *highest* Velocity value in the selection.

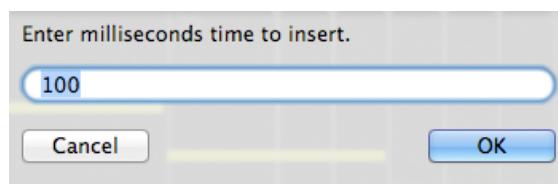
Quick shortcut: make a selection and type “v” to show the velocity slider.

Alter Timing

Sometimes you may find that the timing of your tapped performance could be improved by removing or inserting just a few tens of milliseconds in between selected taps. MIDI Tapper provides an easy way to do this, without having to select large numbers of events. Simply place the Tap Pointer at the point where you need to add or remove time, and then **right-click** and choose **Alter Timing > Insert Time** or **Remove Time** and **Before Tap** or **After Tap**.



A dialog opens with an entry field for inputting a value in milliseconds to insert or remove.



The specified number of milliseconds is then added or removed from before or after the Tap Pointer as selected. It is important to remember that the time is inserted or removed relative to the Tap Pointer, *not* at the location when you have **right-clicked**.

To fix timing issues, place the Tap Pointer nearest the location where you want to insert or remove time, select *Before Tap* or *After Tap*, and enter a value in milliseconds.

Fringe Offset & Arpeggio Width

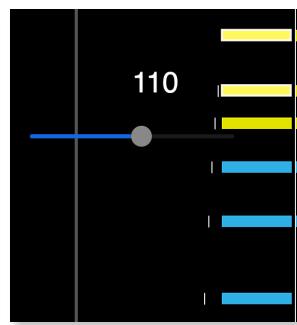
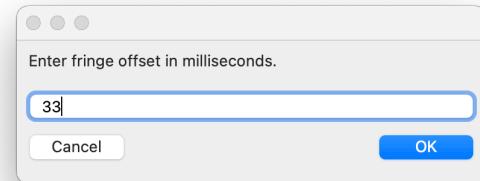
Using **Fringe Offsets**, you can change the onset time of a note or notes in a group relative to a tap, without requiring multiple taps. This can be used to give a more realistic rhythmic effect in general, especially for keyboard and guitar music, where all notes in a chord are rarely played at exactly the same time in real performances. A limitation of this feature is that you cannot hear the altered attack patterns in real time as you tap; they will only be heard when playing back recorded takes.

Fringe Offsets are measured in milliseconds. A *positive* value places the onset of the note *after* the tap, and a *negative* value places the onset *before* the tap. When you set or move offsets in the **Detail View**, notes already recorded will be altered accordingly.

Fringe Offsets refer to attack times of notes relative to a tap.

- measured in milliseconds, *positive* values are *after* the tap, *negative* values *before*
- cannot be heard in real time; can only be heard when playing back a recorded take
- changing offsets in the **Detail View** will accordingly alter notes already recorded

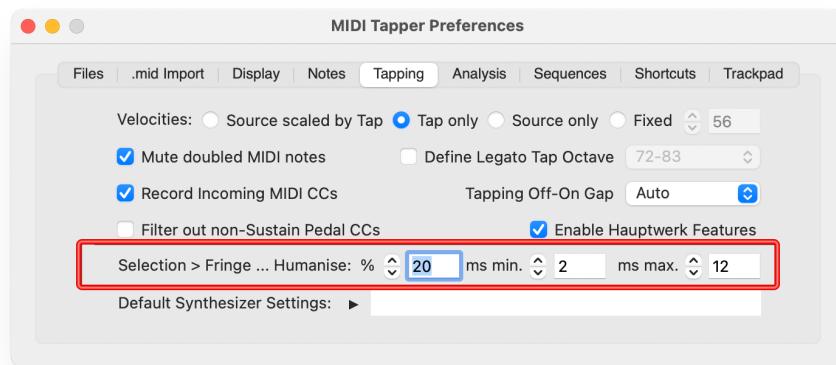
To change the attack times of individual notes relative to a tap, select any note or notes, **right-click** and use the menu item **Fringe Offset > Set Value**. A window will appear in which you enter a value for the offset in milliseconds. The keystroke “f” will open this dialog.



To create a single-tap arpeggio, select two or more notes from a group, **right-click** and use the menu item **Fringe Offset > Set Arpeggio Width**. A slider will appear. As you move the slider, the fringe offsets for all but the highest note in the group will move together in a slightly curved pattern. The bass note will be moved *ahead* of the tap, and each note above the bass will be closer to the tap, with the highest note remaining on the tap to recreate a typical chord “strumming” effect using a single tap (rather than ungrouping).

Fringe Offset Humanisation Functions

In a tapped performance, all the notes in a tap (i.e. chords) sound together at the same millisecond by default. Although humans are capable of performing at a similar level of accuracy, real people tend to avoid doing that, because the effect is too mechanical. Instead, chords are played in such a way that the notes sound at slightly different times. Sometimes chords are “broken” from bottom to top, as discussed above (*Fringe Offset > Set Arpeggio Width* can be used when this effect is desired). The arpeggio effect is however not something that should happen too often, because it may also become mechanical-sounding. In real performances (especially of keyboard music), the notes of a chord will not necessarily be arpeggiated, but will usually sound within a time span separated by up to about 30 milliseconds, not exactly all at once. Therefore, adding small offsets to notes in the chords of your tapped performances can give a richer and more realistic effect. One way to test this theory is to *Select All, right-click* and choose *Fringe Offset > Humanise Chords Only*. Only the notes comprising chords (including two-note groupings, but not single notes) will be randomly shifted slightly from their tapped positions according to the options chosen in the *Preferences Window* under the *Tapping* tab.



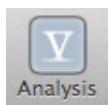
The default settings will change *Fringe Offsets* mildly, moving note attacks between 2 to 12 milliseconds from the tap time. Increase these numbers for more radical effects.

The percentage value is used for two other menu options, *Fringe Offset > Humanise Randomly* and *> Humanise Unfringed Randomly*, which will move the attack times not only of notes in chords, but also of single notes. The idea in these cases is to reduce mechanical effects resulting from rhythms which are too uniformly precise – what might be called “too perfect” rhythm, because human performances tend to include a small level of imperfection in terms of rhythmic precision. In order not to make the performance simply sound “sloppy”, not all notes will be changed, rather only the *percentage* defined in the *Preferences Window*. Care should be taken to review the results when using these functions, to “clean up” any randomly shifted notes which may lend an unwanted unnatural “sloppiness” to the performance. Simply select any offending notes and set the *Fringe Offset* back to 0 (see

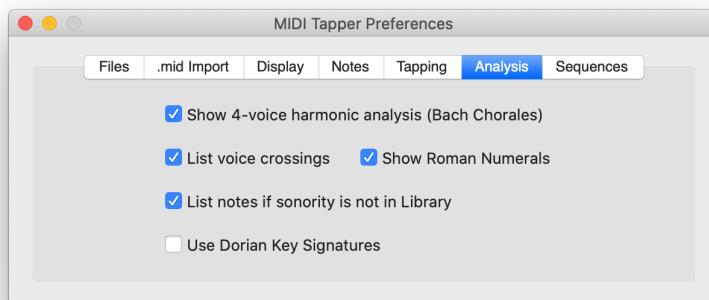
above). The option *Humanise Unfringed Randomly* acts only on notes which have not already had their offsets changed.

Use *Fringe Offset > Humanise* to randomly alter the onsets of a percentage of notes.

17. Analysis



MIDI Tapper is capable of analysing tonal four-part harmony, using a library of sonorities derived from nearly 400 four-part (SATB) chorales written by Johann Sebastian Bach (1685-1750).



Four Voice Harmonic Analysis

Composition in four parts (SATB) forms the basis of instruction in harmony throughout the Western world, and the chorales of J.S. Bach serve as the model of perfection of this technique. The analysis engine in MIDI Tapper is based solely on Bach's 4-part chorales, wherein every vertical sonority is analysed as a triad with possible extensions, suspensions or added dissonances, or omissions. When dissonances are present, they are considered to be integral members of the sonority. This approach differs from that often used to analyse 4-part chorales, where dissonances are separated from triads into various types of *Non-Chord-Tones* (NCTs). Including dissonances as chord members allows unique labels to be given to all unique sonorities, and is also an important concept for developing one's harmonic vocabulary.

Chord Symbols

MIDI Tapper focuses on identifying vertical sonorities with Chord Symbols, to display maximum information in a single label. A simple common Chord Symbol shows a *Root* and *Quality*, such as the Chord Symbol for a root-position G Minor triad, shown at right.

Root → **G**
(GB♭D)
m ← Quality

A Chord Symbol in its most elaborate form can show a *Root*, *Quality*, *Extensions*, *Suspended* or *Added* dissonances, *Omissions*, and a slash followed by a *Bass Note* when it differs from the *Root Note*. A diagram of such a Chord Symbol is shown at right.

Although Chord Symbols are normally used in the composition and analysis of modern jazz, the rich diversity of sonorities used in Bach

Quality → **m7 add 2, no 5th**
Root → **G**
Extension ↓
Added Dissonance ↗
Omission ↗
/ **F** ← Bass Note
(GAB♭F, where F is the lowest sounding pitch)

Chorales has only loose connections to jazz. The logic used for naming Chord Symbols in the MIDI Tapper library is thus not based on a jazz paradigm, but rather directly reflects the aesthetic of Bach's chorales, with particular care given to the manner in which dissonances were treated by Bach.

Suspended vs. Added Dissonances

When deciphering a Chord Symbol, it is important to understand the difference between a suspended dissonance, which is indicated in a Chord Symbol by **sus**, and an added dissonance, indicated by **add**. Luckily, the difference is simple. Any dissonance which takes the place of the 3rd in a chord is labeled **sus**. If the dissonant note is present *in addition to the third* of a chord, it is labeled **add**.

Label	Dissonance
sus	<i>replaces the third of a chord</i>
add	<i>the third of the chord remains</i>

Any note labeled **sus** in a Chord Symbol may or may not be an actual *suspension* in terms of the strict use of that term in part-writing analysis.

Dissonances in the Bass

When a dissonant note appears in the bass, analysis using Chord Symbols and Roman Numerals can become somewhat confusing. To clarify matters, whenever a dissonant note is in the bass, MIDI Tapper Chord Symbols show include the word (**bass**) in parentheses next to the listed dissonant note in the Chord Symbol.

Key Signature Events in MIDI Files

MIDI data in general does not contain note-name information (a C-Sharp and an D-Flat are both represented by the same data), so although it is not difficult to identify a Major triad in a MIDI file, it is not possible to differentiate between a C-Sharp Major triad and a D-Flat Major triad. Key Signatures can help to solve this problem. MIDI files can contain Key Signature events, but unfortunately many files either do not contain this information, or contain wrong information. When a Key Signature event is included but indicates a wrong key, MIDI Tapper allows the existing event to be edited, either in the Detail View or in the MIDI Events Window.

Dorian Key Signatures

In music of the baroque era such as the music of J.S. Bach, Key Signatures for Minor flat keys sometimes follow a “Dorian” convention (as a holdover from modal practice), omitting one flat in the Key Signature. For example, D Minor may be written with no flats instead of one, or C Minor may be written with two flats instead of three. Since changing a Key Signature in a MIDI file might be seen as an unwanted altering the composer’s original score, MIDI Tapper includes an Analysis option to instead analyse the file according to a Dorian Key Signature. Selection of a Dorian Key Signature for analysis is left up to the user.

Roman Numerals

 Roman Numeral analysis in MIDI Tapper is based on present day standard music theory derived primarily from the work of Jean-Philippe Rameau (1683-1754), in which Roman Numerals representing diatonic scale degrees and triad qualities are combined with Figured Bass symbols commonly referred to as inversions, extensions, and alterations.

Accurate functional harmonic analysis using Roman Numerals requires identification of local key centers and modulation. Because MIDI files provide very little context for the spelling of notes, and no cues at all concerning modulation, MIDI Tapper does not implement a complete system of functional Roman Numeral analysis. Roman Numeral functional identification is limited to the following cases.

1. *Diatonic triads and 7th chords in the Key designated by the MIDI File*
2. *Secondary Dominants & Leading Tone chords for diatonic chords which may normally be assigned temporary tonic function*
3. *Augmented Sixth Chords in any key area (conventional inversions only)*

Roman Numeral analysis without context for modulation often results in an empty result, so that even when Roman Numeral Analysis is selected, results may be lacking for many sonorities. Results that are given also may sometimes appear questionable, due to lack of key-center context. To avoid such results, this feature may simply be deactivated.

Unknown Sonorities

In any case where a sonority is unknown, note names may optionally be listed. Octave numbers are included with letter names, according to the North American system where middle C is called C4. Any 4-voice (or fewer) sonority which does not appear in Bach’s chorales will not be identified by MIDI Tapper. Any chord consisting of more than four unique pitches also will not be identified, even though some of these sonorities are very similar to those that MIDI Tapper understands.

Voice Crossings

Trk. 4 × 3 Ch. 3 × 2 Voice crossings are found by comparing pitches on neighbouring MIDI Tracks and Channels. For example, if Track 2 contains an Alto voice, and Track 3 contains a Tenor voice, and a note on Track 3 is higher than a note on Track 2 in a given sonority, then that sonority is marked as containing a voice crossing per Tracks 2 & 3. The same logic is applied to channels which cross, either on separate tracks, or on the same track. Obviously, MIDI files must be prepared with this function in mind in order for these results to be meaningful.

Analysis Manifest

A summary of MIDI Tapper's analysis of a given file is viewable as a text output list via the menu item **Window > Analysis Manifest**. The Manifest includes the number of unique sonorities, chord types, qualities, and voicings. The table below clarifies what is meant by each of these terms.

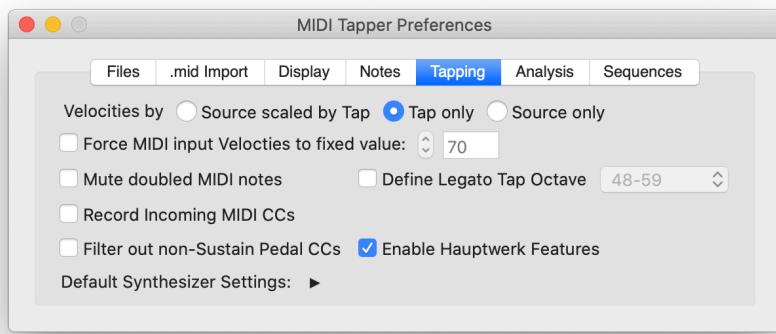
sonority	<i>any vertical combination of pitches (including repetitions)</i>
voicing	<i>a unique sonority, considering all pitch placements</i>
type	<i>the general form of a sonority, disregarding pitch placement above the bass</i>
quality	<i>the general form of a sonority, disregarding all pitch placement</i>

18. Hauptwerk Features

Hauptwerk is software for playing sampled pipe organs via MIDI. MIDI Tapper provides many special features for Hauptwerk users for creating convincing performances of music for organ, including importing stop lists for various organs, automated assignment of voices to the divisions of the organ, and inserting registration changes into the tap stream. It is assumed that the user has the latest version of Hauptwerk, which at the time of this writing is Hauptwerk 4. Earlier versions of Hauptwerk have not been tested with MIDI Tapper.

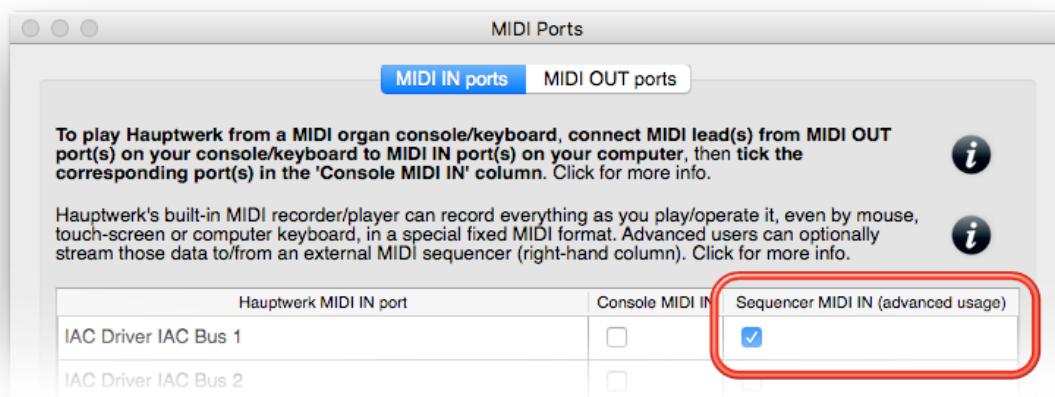
Enabling Hauptwerk Features

Because not all MIDI Tapper users need these functions, Hauptwerk users must first open the Preferences Window under *Tapping*, and check ***Enable Hauptwerk Features***. After Hauptwerk features have been enabled, additional menu items are available.

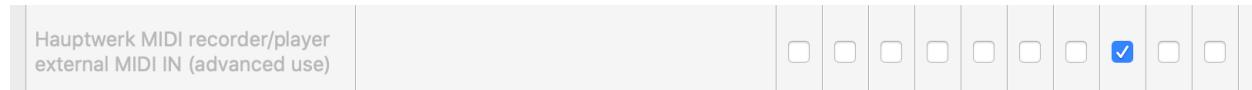


Preparing the MIDI Port in Hauptwerk

To receive notes and registration changes from MIDI Tapper, Hauptwerk must have a MIDI IN port set to “***Sequencer MIDI In (advanced usage)***”. This is done in under the main menu item ***General Settings > MIDI Ports ...*** In Hauptwerk version 4, this is a column heading.



In Hauptwerk version 5 and above, it is a row heading on the left, with text which is also a bit difficult to read. In each case, you need to select a MIDI input port by checking a checkbox.



This port must also be selected as the MIDI Output port (called the *MIDI Output Destination*) in MIDI Tapper. Click on the **MIDI** toolbar icon or select the menu item **MIDI > Input / Output** to set the output port to the one you have assigned to sequencer input in Hauptwerk.

Importing Stoplists

To support organ registrations, MIDI Tapper needs a list of stops for each organ. Hauptwerk supplies this information in the form of an .xml file only when you open the menu item **Recording > View Hauptwerk MIDI recorder/player fixed, predefined MIDI implementation (for this organ)**... An .xml file is then generated which can be imported into MIDI Tapper. The location of the file varies with different versions of Hauptwerk, as explained below.

Hauptwerk instrument stoplist files begin with the name of the organ, end with “MIDI Recorder MIDI Implementation.xml” and are generated by Hauptwerk in the following directory:

v4: *Hauptwerk > HauptwerkUserData > OrganMIDIImplementationExports*

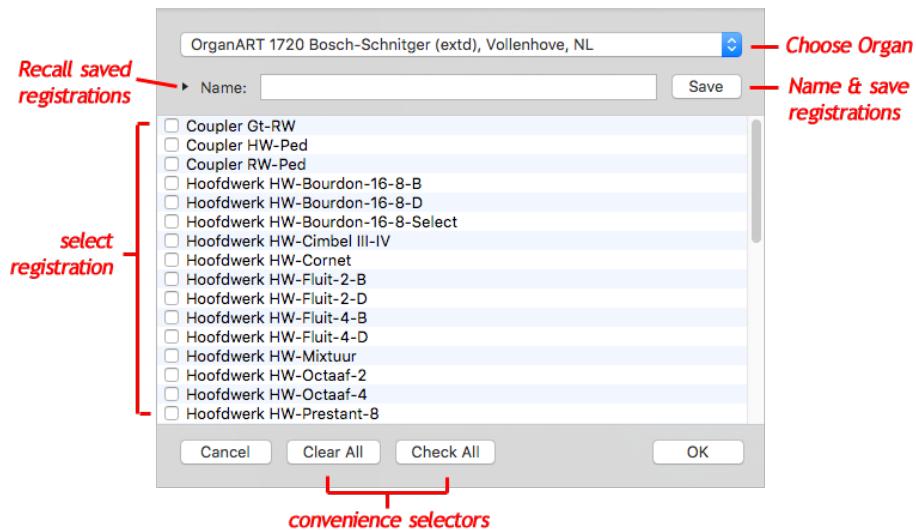
v5 and up: *Hauptwerk > HauptwerkInternalWorkingFiles > GeneratedDocumentation*

Note that Hauptwerk will only do this when you select the menu item, and Hauptwerk will also delete this file when you restart Hauptwerk, so when you do this, it is a good idea to drag the file out of the generated location and put it somewhere else so that you won’t need to generate it again.

Once you have the .xml file, in MIDI Tapper, go to the menu item **File > Import Hauptwerk Stoplist** and navigate to the stoplist xml file for the organ you want to work with. Once the xml file is loaded, Hauptwerk registration changes for that organ can be inserted into the tap stream. If you find that there is no file for the organ, contact the maker of the sample set and ask them to provide a MIDI Recorder MIDI Implementation.xml file. For information on the xml files, please see the documentation for Hauptwerk.

Inserting & Managing Hauptwerk Registration Changes

Once a stoplist has been imported, you can *right-click* in the Detail View and select the menu item **Insert Hauptwerk Registration**. A window will then open with a list of checkboxes for each available register of the organ (couplers and tremulants are included). For example, the following list appears for the 1720 Bosch-Schnitger Organ from OrganART Media.



If stoplists for multiple organs have been imported into MIDI Tapper, each organ is selectable using the popup menu at the top of the window. Registrations can be named, saved and recalled for each organ. Simply type a name into the **Name** field and click the **Save** button. Recall saved registrations by clicking the triangle to the left of the **Name** field.

An inserted Hauptwerk registration gets connected to the nearest existing tap. For modern electric-action organs having pistons, this may be fine since it is normal to press a piston button to change registration at the same time notes are played; however, mechanical organs do not have such pistons and require reaching over and pulling or pushing stops, which are often heavy, so to maintain realism, registration changes for these organs should be kept separate from note events with reasonable time in between note events to simulate the physical effort required to make the changes. Separate an already inserted registration from existing note taps, simply *right-click* where you want the registration change to occur (somewhere between note taps) and select **Insert Empty Tap**. To move the registration to the empty tap, hover over the blue MIDI DIN icon representing the registration until the grabbing-hand icon appears, then click and drag the registration to the newly inserted empty tap. A blue box outlines the destination as you drag the event.

An existing registration can be edited by *right-clicking* the blue MIDI DIN icon and selecting the menu item **Edit Hauptwerk Registration**.

Preparing an Imported MIDI File for Hauptwerk

Many tedious tasks are done at once when you click on the **Tracks** toolbar item and select **Prepare for Hauptwerk**. The tasks done are as follows:

- *Tracks are renumbered by voice range*
- *Channels are numbered “intelligently” according to how many Tracks are present*
- *An Empty Tap + Hauptwerk Registration is inserted as the first tap*

The following sections explains why these things are done and will help you understand how to prepare your MIDI files better for use with MIDI Tapper and Hauptwerk.

Hauptwerk & MIDI Channels

Hauptwerk assigns a unique MIDI channel to each division of each organ, numbering up from the bottom, Pedal = channel 1, lowest Manual = 2, etc., which is logical but does not correspond to the way MIDI files are structured. The data in MIDI files is organised into Tracks and Channels, usually numbered in the reverse order. Hauptwerk only recognises Channels, and Track information is completely ignored. Because of this, MIDI files need to be specially prepared for Hauptwerk.

Organ music is usually written on three staves, normally represented in a MIDI File as three Tracks. Unless the maker of a MIDI file manually assigns MIDI channel numbers, each Track will use the same default MIDI channel 1. Sometimes Tracks may also be numbered in a confusing order, in which case clicking on the **Tracks** toolbar item and selecting **Order Tracks by voice range** will fix the problem. Hauptwerk expects three different channels, so these often need to be renumbered, which can be done by clicking on the **Tracks** toolbar icon and selecting **Auto-Number Channels per Track**. All the notes on Track 1 will be assigned to channel 1, all the notes on Track 2 will be assigned to channel 2, and so on.

Swapping Hauptwerk Manuals

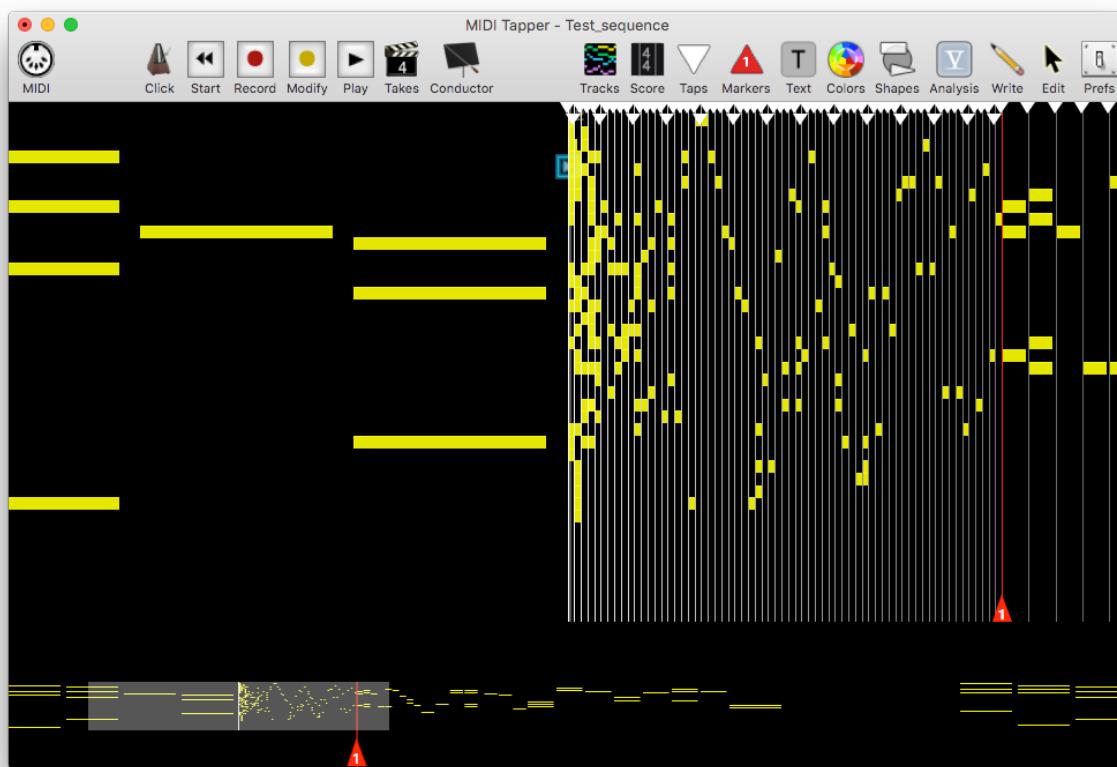
Sometimes when deciding a registration, you may want to simply swap the manuals (for example, this can happen when looking for the best solo stop for a chorale-based piece). Click on the **Tracks** toolbar item and select **Swap Hauptwerk Manuals**. It is assumed that you are working with a two manual instrument, so what this function does is to swap the channel assignments for notes on channels 2 and 3, regardless of which tracks they are on.

Additional Features

The features implemented so far in MIDI Tapper to support Hauptwerk should be enough for most users, but you may find something missing that you need. Additional Hauptwerk features can be requested using the menu item **MIDI Tapper > Request a Feature**.

19. Sequences

A **Sequence** may be used to automatically play back an assigned portion of source data, or a portion of corresponding recorded take data. This is useful when a passage is very difficult or impossible to tap. When a **Sequence** is defined, a tap serves as a **Trigger** to begin automatic playback of the selected data. During Sequence playback, a MIDI CC such as Modulation can be used to shape Note ON Velocities, and MIDI Pitch Bend can be used to control the tempo of the Sequence playback. When a Sequence ends, tapping resumes normally. Below is an example project showing a burst of MIDI data that would be impossible to tap in real time.



Setting a Sequence

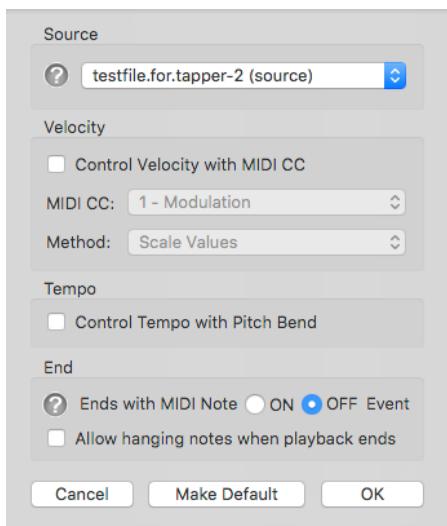
To define a Sequence, follow these steps:

1. **Select a group of notes to define as a sequence.** Every single note does not need to be selected. You may select only a first note and last note, and MIDI Tapper will automatically select all the other notes in between those two selected notes to assign to the Sequence. **Chapter 7** outlines different ways that notes can be selected which can save you time. Use whatever method works best for the given situation.

2. With the defining notes selected, *right-click any blank area of the Detail View and choose the menu item Sequence > Set Sequence*. If you have recorded takes, the option appears both under the *Current Take* menu and the *Source Data* menu.

3. The **Sequence Window** will appear to set the details of the Sequence.

Sequence Window



In the Sequence Window, the **Source** refers to which take is to be used for the Sequence. If you have opened the window from the Current Take menu, the Source will be set to the current take.

Note ON Velocities may be controlled using a MIDI CC by replacing or scaling the values from the Source. Pitch Bend control of playback Tempo is also optional.

The sequence may end with a Note ON event, or a Note OFF event, and any hanging notes within the sequence will be turned off automatically when playback ends, unless you choose to allow notes to hang.

The button **Make Default** assigns the currently selected settings as default options for new sequences. Other default options for Sequences are also available in the Preferences window.

Source

A Take may be assigned to a Sequence only if at least one note in the sequence exists in the take. If any notes in the Sequence do not exist in the Take you attempt to assign to a Sequence, a warning window appears telling you that notes are missing. All notes assigned to the Sequence cannot be tapped, but those notes which are missing from the Take will remain unassigned and must be tapped. So whereas a missing notes warning would seem to be good reason *not* to assign that Take to that Sequence, there may be cases where you want to intentionally leave notes out of the Sequence playback, so that you can tap them manually along with the Sequence, which is why the option remains available.

Velocity

If you have selected either of the checkbox options in the Sequence Window, you will be able to shape the velocities and / or the tempo of the Sequence playback. For velocity control, incoming CC values can be mapped directly using the menu option **Replace**, so if a CC value of 60 is received, all notes in the sequence are assigned a velocity value of 60 until the next

CC message is received. The *Scale* option uses the CC value as a percentage scaling of the original value. So, if the original value is 70, a CC value of 127 will produce that value at 100%, and a CC value of 64 will produce a value of 45, the original value at 50%.

Filter out non-Sustain Pedal CCs

Depending on your MIDI output destination, using CC input during tapping when a Sequence is *not* playing back could alter playback in an unwanted way, for example using CC1 Modulation may add a vibrato to the sound. To stop this from happening, an option has been added to the Preferences window on the *Tapping* page to *Filter out non-Sustain Pedal CCs* when Tapping normally.

Tempo

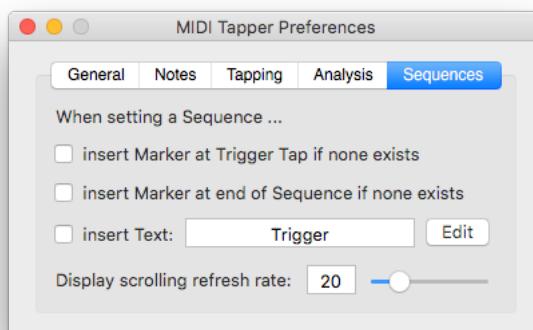
The Pitch Bend option will control tempo as a scaling factor between 1/2 and 2: centre bend is the original tempo, full bend up is twice as fast, and full bend down is half speed. When this option is checked, if a Pitch Bend value has been received before a Sequence begins its playback, the Sequence will begin with that tempo scaling.

End

The sequence can end with the MIDI Note ON event or the MIDI Note OFF event from the last selected note. If you choose the Note ON option, this means that the last note (and any other notes beginning at the same time) will be sounding when sequence playback ends. All other notes within the sequence will be turned off at the end of sequence playback, unless you choose to allow hanging notes, in which case turning off sounding notes is handled by tapping after playback ends.

Sequence Preferences

Every Sequence *Trigger* is marked by a play-button icon. Apart from this, the appearance of a sequence depends on which options you have selected in the Preferences window.



Sequence Markers & Text

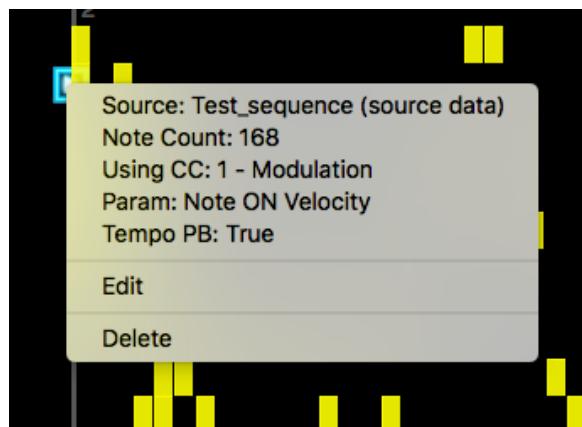
Markers and Text may be added automatically when you set a Sequence. A Marker may be added at the start of the Sequence (at the Trigger Tap). Visually this is not really necessary, because the Trigger is already clearly marked by a Play icon, but a Marker at this point can aid in navigation, especially if you are working with many Sequences. A Marker at the end of a Sequence is visually helpful because there is no default cue marking the end of a Sequence, and it is important that you be ready to continue tapping at the point the Sequence ends. A Text option allows you to easily name Sequences or make quick performance notes. Note that these objects are *not* linked to the Sequence internally.

Display scrolling refresh rate

This parameter refers to how often the Detail View is to be updated when sequences are playing back. This number should be less than 20 for computers having slower processors or older graphics hardware. 20 should be adequate for normal purposes. When you increase the number, the screen will refresh more often, which may slow down playback, depending on how large the screen is and how complex the data is.

Editing Sequence Parameters

Clicking on the play icon displays a popup menu showing the details for the sequence with options to edit or delete it. Selecting **Edit** opens the Sequence window, in which you can select which take to play back for the Sequence. This is especially useful for shaping the sequence data. A sequence is recorded the same way that tapped MIDI is recorded, so it is possible to Sequence raw source data and shape the Note ON velocities, and then reassign the that recorded take to the Sequence. Since the Tempo setting of the source take is respected when the Sequence plays back, you can record a Sequence with shaped velocity, tweak its tempo, and then reassign that take to the Sequence.



Deleting a Sequence

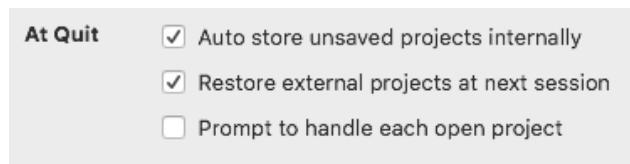
A Sequence may be removed at any time by following these steps:

1. *Select any (does not need to be all) of the notes belonging to the Sequence.*
2. *Right-click and choose the menu item Sequence > Unset Sequence* (if you have recorded takes, you may need to select the *Source Data* submenu).

Note that any Markers and Text which were automatically added to the Sequence when it was set will not be removed, because these objects are not internally linked in any way to the Sequence.

20. Project File Handling

In the *Preferences Window* you will find a list of options for the behaviour of MIDI Tapper when you quit the application.



Auto store unsaved projects internally

Check this option if you would like open projects that have not been saved to be stored automatically when you quit. You can then work without having to manage external project files at all, which may be more convenient in some cases. The project files will instead be stored in the following location:

/Users/UserName/Library/Application Support/MIDI Tapper/Sessions/

If you purchased MIDI Tapper from the Mac App Store, the above location exists inside your / Users/Username/Containers directory. Note that project files which have been opened as external files will *not* be stored internally, but rather will be stored at the location of the external file.

Restore external projects at next session

Check this option if you would like all open projects to be reloaded automatically the next time you open MIDI Tapper. MIDI Tapper will then store the paths to open projects in a file called *projectpaths.xml* in the directory listed above. When using this option, be aware that if you move your project files around after quitting MIDI Tapper, the paths will no longer match and the moved files will not be opened when you reboot MIDI Tapper.

Prompt to handle each open project

Check this option if you want to use the above automatic project saving and loading options, but also want to have control over exactly what will happen to each project when you quit. A dialog will then appear for each window asking you what you want to do with that project. This is the default behaviour.

Discarding a Project

When using the automatic options described above, MIDI Tapper gives you options to save projects internally or externally. If you want to discard the file, select *Options*, and select *Discard*, or choose *Save Externally*, cancel that operation, and then close the window.

APPENDIX I: Supported Tuning File Types

MIDI Tapper supports seven types of tuning files. The file extension must be included with the file name in order for the file to be visible to MIDI Tapper.

.scl	text list of tones as scales in ratio or decimal form
.csv	text list of 128, 512, or 2048 MIDI Note + 14-bit Pitch Bend values
.hz	text list of 128, 512 or 2048 Hz values
.tun	text list of 128 cents values
.mtx	text list of frequency values with other special information
.gly	binary file exported from <i>Absynth</i> (Native Instruments)
.tonex	text list of scale tones in a variety of formats using xml tags

.scl

The Scala format is by far the most widely used and widely available tuning files. For details on this format and how to use it, see http://www.huygens-fokker.org/scala/scl_format.html

.csv

This is a file format used by H-Pi Instruments [Custom Scale Editor \(CSE\)](#), [Tonal Plexus Editor \(TPXE\)](#), and [H-Pi Lo-Fi Microstudio \(HPLF\)](#) software. These files consist of comma-separated lists of MIDI bytes as MIDI NOTE, PITCH BEND MSB, PITCH BEND LSB. In a .csv file, there is no information concerning a scale as such. The files may list 128, 512, or 2048 values. A list of 128 values is a tuning for one MIDI channel. A file listing 512 values covers 4 MIDI channels of 128 notes each. The 512 tone files are used by [CSE](#) for Tuning Box TBX1 hardware, which supports tunings in four layers, one layer per MIDI channel. 2048 values covers all 16 MIDI channels, used by [TPXE](#) for Tonal Plexus keyboards, where each physical octave of the keyboard is mapped to two MIDI channels.

.hz

This is a file format used by H-Pi Instruments [H-Pi Lo-Fi Microstudio \(HPLF\)](#), also supported by [CSE](#), [TPXE](#) as an export format. They are text files consisting of a simple list of frequency

values in Hz. The numbers of tones listed in the file correspond to the same options listed above for .csv files; that is, 128, 512, or 2048.

.tun

These files are also known as VAZ-Anamark files, and can exist in a few different varieties, but the majority of these file consist of a list 128 cents values. The cents values are given in reference to the lowest MIDI note 0, and this form of the file contains no scale information as such. More information on this format can be found at <http://www.mark-henning.de>.

.mtx

These files are created by Max Magic Microtuner software. Details on this format can be found at <http://digilander.libero.it/microtuner/MicrotunerFormat.pdf>.

.gly

These files are created by *Native Instruments* Absynth software, and the format is also exported by [Scala](#) (by Manuel Op de Coul), and [CSE](#). Because .gly is a binary file, there are no public details on the file type, and it is impossible to make the file as text or to view the file contents as text, except in a hex editor. The file data itself is an encrypted list of 128 Hz values, one value per MIDI note.

.tonex

This is an experimental filetype supported by MIDI Tapper, which uses xml tags to specify different aspects of a tuning. MIDI Tapper supports simple .tonex files which list tones in scale order using *tuning entries*.

Two sample files of each supported file format are included with MIDI Tapper. The files are installed in *User/Music/MIDI Tapper* in the following folders:

- Tunings scl
- Tunings csv
- Tunings tun
- Tunings hz
- Tunings gly
- Tunings mtx
- Tunings tonex

APPENDIX II: Previous Documentation Changes

Below is a list of changes made to previous versions of this documentation. The current changes are listed at the beginning of the manual under **Documentation Changes**.

v6 - May 5, 2021

- **Chapter 6:** updated with Preferences option for single-key Marker set/unset
- **Chapter 17:** updated *Preparing the MIDI Port in Hauptwerk* with a screenshot from the current version of Hauptwerk, added a full explanation of the steps required under *Importing Stoplists* with updated details concerning different versions of Hauptwerk. Improved chapter text for clarity.
- **Throughout:** update images of Preferences Window

v5 - February 12, 2021

- **Chapter 19:** added new chapter *Project File Handling*.

v4 - December 15, 2020

- **Chapter 2:** updated *Using Velocity Scaling* with new *Fixed Velocity* option, and added section explaining *Define Legato Tap Octave* option.

v3.1 - February 20, 2019

- **Chapter 18:** updated text for new Sequence options “allow hanging notes” and “end event is Note ON”.

v3 - February 1, 2019

- **Introduction:** added step for assigning *Sequences* (new feature) to *Workflow*
- **Chapter 2:** reworded definition of “Tapping” concerning “levels of complexity” and mentioned the new *Sequence* option as the preferred method for performing music of complexity beyond normal performance levels. Added section *Extremely Difficult Passages* to mention the new *Sequence* option.
- **Chapter 8:** added description of trill options (either 7 notes long, or the whole duration of an existing note). Added *Split & Merge Notes* section describing these new editing features.
- **Chapter 18:** New chapter added on Sequences (new user-requested/commissioned feature).
- **Throughout:** updated images of the Preferences window since it has been reorganised.

v2 - December 15, 2018

- **Chapter 17:** New chapter added to explain all new features added to MIDI Tapper for working with Hauptwerk virtual organ software.
- **Introduction:** Updated Mac minimum OS version to 10.10.5 (unavoidable)
- Added this section for quick overview of changes.
- Added version number and publication date to the page header.

v1 - October, 2017

- **First release (following two years in beta with no documentation)**

Credits & Resources

All versions of MIDI Tapper are designed and programmed by Aaron Andrew Hunt, using [Xojo](#) and [MBS Plugins](#) on a [Mac](#).

MIDI Tapper is conceptually based on the work of [Stephen Malinowski](#), inventor of [Music Animation Machine](#) and [Tapper](#) music software, the forerunner and inspiration behind MIDI Tapper.

This documentation is written by Aaron Andrew Hunt, using Apple [Pages](#).

Thank you for supporting H-Pi Instruments and MIDI Tapper.

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